Catch, Size, and Age of Chinook and Coho Salmon taken in the Strait of Georgia Troll Fishery in 1983

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by

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ABSTRACT

Carter, E. W., L. A. Lapi, and E. A. R. Ball. 1986. Catch, size, and age of chinook and coho salmon taken in the Strait of Georgia troll fishery in 1983. Can. Data Rep. Fish. Aquat. Sci. 585: 89 p.

Begining in 1983, the Pacific Biological Station conducted a port sampling program to monitor the commercial troll fishery in the Strait of Georgia. With samplers at ten locations on the east coast of Vancouver Island, troll vessel skippers were interviewed with a series of questions pertaining to hours fished, area fished, and number of fish caught, as they landed their catches. This information was used to calculate the catch per unit of effort (CPUE - number of fish per hour). In addition, biological samples (length, weight, scale sample) of chinook salmon (Oncorhynchus tshawytscha) and coho salmon (Oncorhynchus kisutch) were taken from each vessel's catch.

This report presents the catch data and biological data of the 1983 survey. Summaries of the data are given showing comparisons between statistical areas and combining all areas in the strait. Continuation of this program will allow comparisons between years and can illustrate changes in catch, effort, and biological characteristics of the salmon stocks.

RESUME

Carter, E. W., L. A. Lapi, and E. A. R. Ball. 1986. Catch, size, and age of chinook and coho salmon taken in the Strait of Georgia troll fishery in 1983. Can. Data Rep. Fish. Aquat. Sci. 585: 89 p.

La Station de biologie du Pacifique applique depuis 1983 un programme d'échantillonnage à quai dans le but de contrôler les prises de la pêche commerciale à la traîne dans le détroit de Géorgie. Des préposés placés en dix endroits de la côte est de l'île de Vancouver ont posé aux patrons des bateaux de pêche à la traîne, au moment où ceux-ci débarquaient leurs prises, une série de questions ayant trait aux nonbres d'heures de pêche, aux lieux de pêche et au nombre de poissons capturés. Ces renseignements ont servi à calculer les prises par unité d'effort de pêche (PPUE - nombre de poissons par heur). Des données biologiques (longueur, poids et prélèvement d'écailles) ont aussi été obtenues à partir des saumons quinnats (Oncorhynchus tshawytscha) et cohos (Oncorhynchus kisutch) constituant les prises de chacun des bateaux.

Le rapport contient les données sur les prises et les données biologiques obtenues au cours du relevé de 1983. On y trouve des résumés de données qui comparent les zones statistiques entre elles ou combinent toutes les zones du détroit. La poursuite du programme permettra d'effectuer des comparaisons entre les années et d'illustrer l'évolution des prises, de l'effort de pêche et des caractéristiques biologiques des stocks de saumon.

INTRODUCTION

Prior to 1970, several sampling programs were conducted on the Strait of Georgia[1] commercial troll fishery and results of size and age composition of the entire Strait were published (Milne 1964; Ball and Godfrey 1967, 1968, 1968A, 1968B, 1969, 1970). Argue and Marshall (1976) reported the size and age composition of the 1966-67 troll catch by sub-areas to allow comparisons between areas within the Strait of Georgia.

Since 1972, sampling programs have been limited and any data collected remains unpublished. This sampling program was initiated to provide an up-to-date picture of the troll fishery in the Strait of Georgia and various biological aspects of the stocks. Main objectives were (1) to inverview 30 percent of the fishermen who made landings for information on catch and fishing location and (2) to sample between 7 and 10 percent of the total catch for biological characteristics.

This report is a summary of the information collected in 1983 from the Strait of Georgia troll fishery. Included are summaries of catch per unit effort (CPUE-number of fish/hour) by area over time, and of the biological data such as length, weight, and age frequencies by flesh color and area over time. Data presented in this report are based only on interview information and not on information collected from sales slips.

Continuation of this program and collection of data in subsequent years will allow comparisons between years and will illustrate any changes in CPUE or biological characteristics of salmon in the Strait of Georgia troll fishery.

METHODS

SAMPLING

Port samplers were stationed in teams of two at eight locations on the east coast of Vancouver Island including Campbell River, Quadra Island, Comox, Deep Bay, French Creek, Nanaimo, Silva Bay, and Cowichan, while one sampler covered landings in Sidney and Victoria (Fig. 1). Sampling effort was altered according to fishing effort since the troll fleet tends to move northward through the season. Samplers worked off of buyer's scows, wharves, packers, or occassionally observed and sampled aboard trollers. In order to keep interviewing and sampling procedures standard, a sampling manual was issued to each port sampler which included instructions, codes, and diagrams (Appendix A).

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[1]Strait of Georgia includes statistical areas 13, 14, 15, 16, 17, 18, 19, and 29AB. In this report only areas 13, 14, 16, 17, 18 and 29AB were used in calculations.

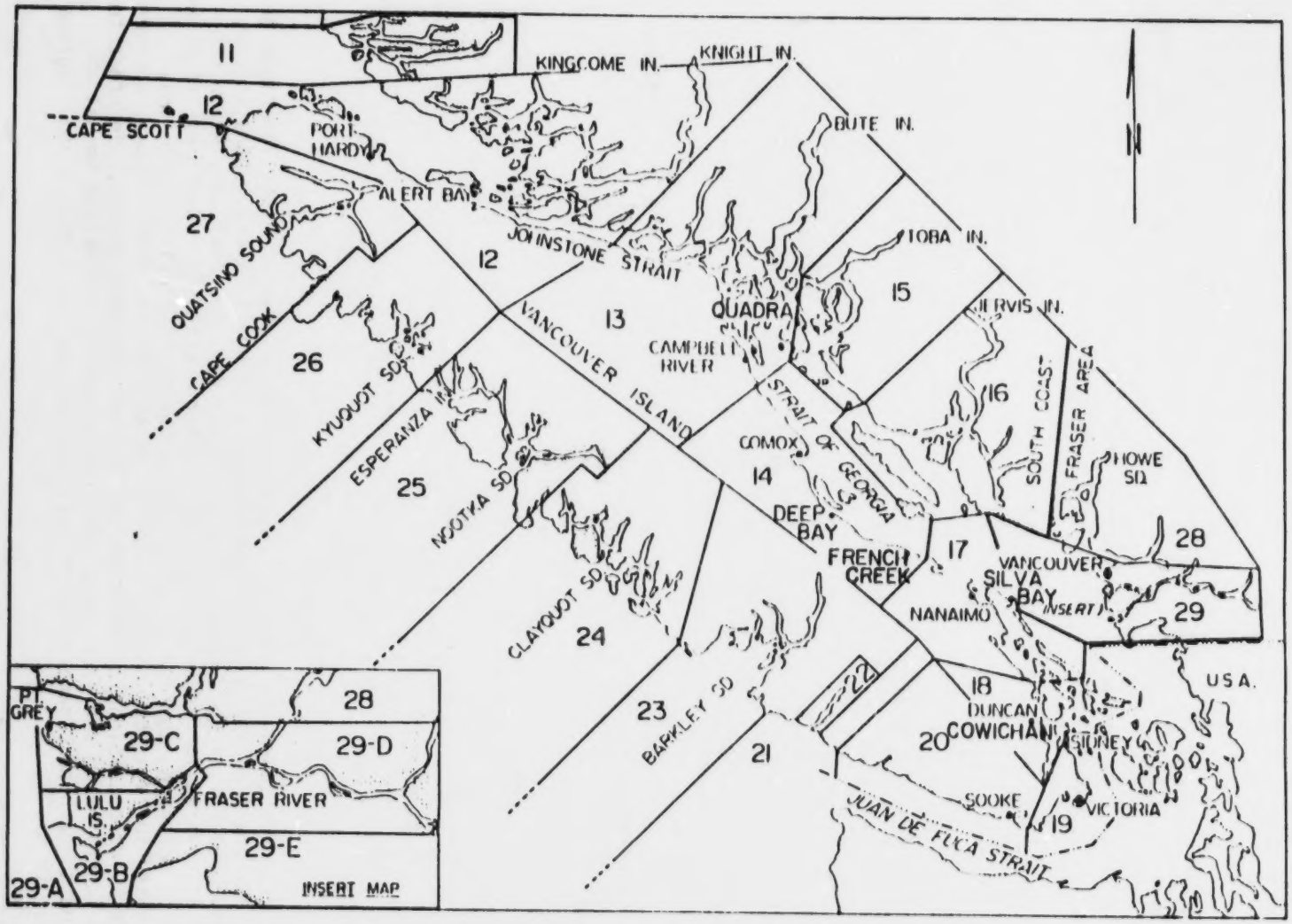


Fig. 1. Statistical areas and sampling locations for the 1983 Port Sampling Program.

The primary objective was to interview individual troll vessel skippers (mainly day boats) as they landed their catches, with a brief series of questions regarding time and area fished, amount of gear run, catches, and discards (undersize salmon and illegal fish). This information was used in the calculation of catch per unit of effort (CPUE - number of fish per hour) by area over time throughout the season. The single most important factor in obtaining this information was to gain the confidence and cooperation of the fishermen. This was achieved by assuring them that all the information given was strictly confidential.

The secondary objective was to sample each troller's catch (100% if possible) for fork length (tip of snout to fork in tail), dressed weight (head on) in kilograms using portable "dairy" scales, flesh color, and to take a two-scale sample from the preferred area (one from each side) from each fish (Fig. 2). Since the fish were dressed (cleaned and gutted) prior to landing, no sex determination was possible unless samplers were aboard the trollers. If time did not permit a total catch sample, samplers were instructed to select larger grades of fish which represented more age classes. In most cases total samples were taken.

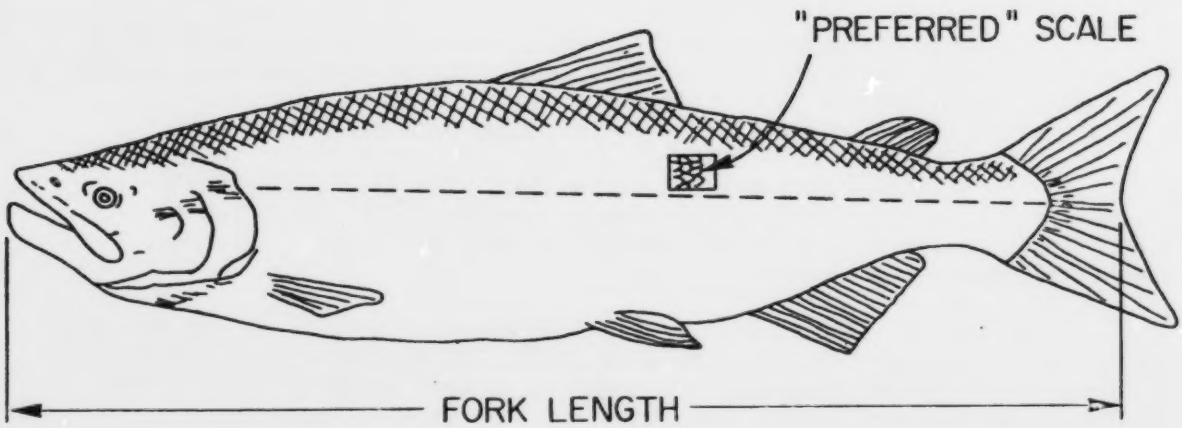
The biological data will provide estimates of length, weight and age composition of the catch by area, by week, month and for the entire season. For summaries of length/frequency for the season, mean weight at length for the season, and all age composition summaries, the partial (non-random) samples have been excluded, since including these would bias the results towards larger, older fish.

In an attempt to provide the fishermen with some data, we have completed and sent summaries of CPUE, shaker/keeper ratios, and length and age frequencies for each vessel and for all vessels combined. This will allow each fisherman to compare his catch with the average of the rest of the fleet.

DATA PROCESSING AND ANALYSIS

Data were picked up once-a-week, sorted, checked for obvious errors, and sent out for keypunching to Vancouver. These were received on tape after one week and both interview and biological sample data were then proofed against the raw data and errors were corrected. Once all the data were edited, the entire interview and biological sample data files were copied onto magnetic tapes for storage. Scale ages were determined at the Biological Station in the ageing lab.

SCALE SELECTION AND REMOVAL



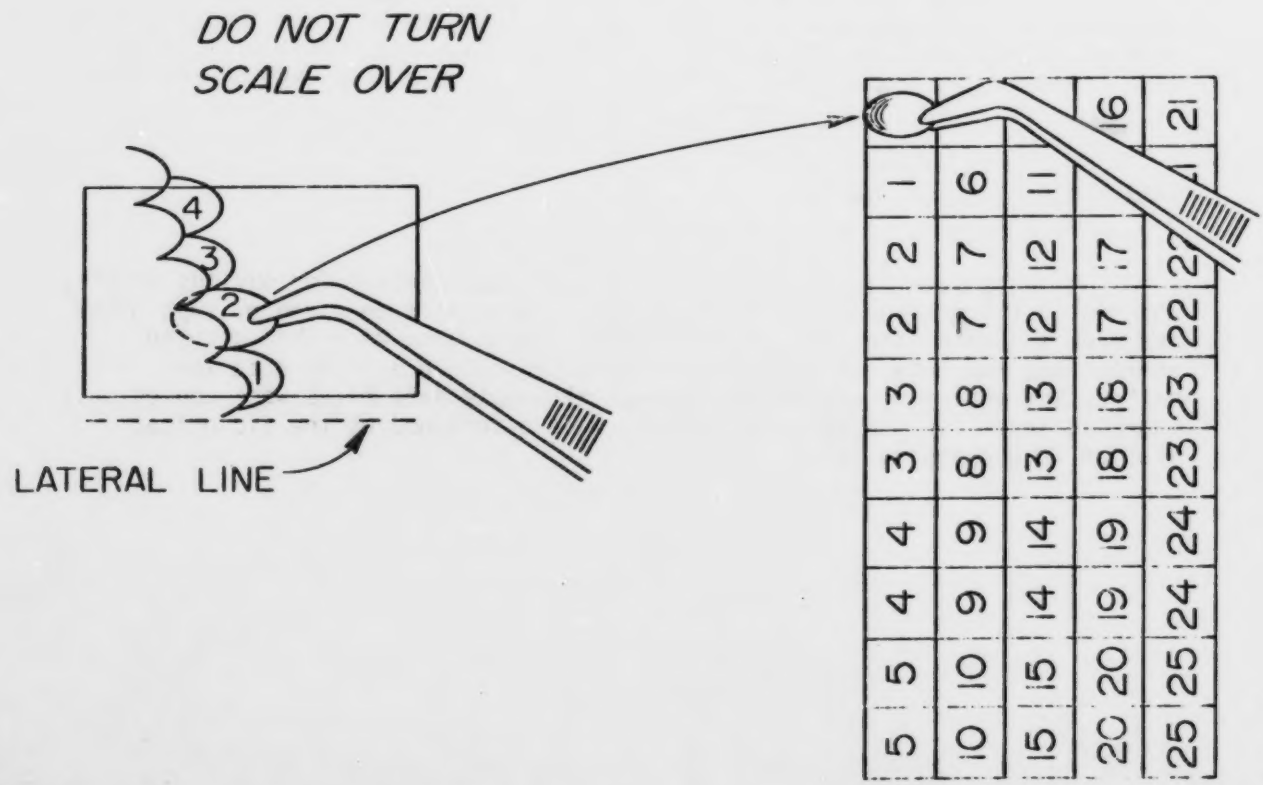


Fig. 2. Scale selection and removal.

RESULTS

The success of the port sampling program was totally dependent on the participation by the fishermen, and the amount of cooperation we received from them cannot be over-emphasized. The primary objective, interviewing 30% of the fishermen making landings, was exceeded and approximately 37% were interviewed based on in-season catch estimates. The breakdown of number of interviews and biological samples by sampling location is given in Table 1. Generally, vessels which began the season in one location, stayed there throughout the season with the occasional move due to openings in other areas.

The second objective, to sample biologically 7 to 10% of the total landings for length, weight, and scale samples, was also met and the number of chinook samples (9,532) was 9.3% of the total Strait of Georgia troll catch of 102,365 pieces[1]. Of the 9,523 chinook sampled, 91.6% (8,720) provided scales which were suitable for ageing. Tables 2 and 3 give the catch and sample size by area over the season.

CATCH PER UNIT EFFORT (CPUE)

The main reason for conducting interviews was to collect information from which catch per unit of effort (CPUE) calculations could be made. Initially, these figures can only be used for comparisons between and within statistical areas over the season. In the long term, however, when comparisons can be made not only between and within areas but also between different years, this measurement can assist in illustrating various trends which may be showing up in the fishery. For example, Table 4 and Figure 3 show a steady decrease in effort in the southern Strait of Georgia (Areas 17, 18, 29) while the northern areas (13, 14, 16) increase possibly suggesting a northward migration of fish stocks or reflecting the distribution of chinook and coho through the season. Although the final CPUE's for chinook in the north and south are close, the overall interviewed catch and effort is considerably higher in the north by 320% (18237 pieces - north, 5707 pieces - south) and 430% (23486 hours - north, 5467.5 hours - south). CPUE was highest in April (2.11) in Area 17 and remained above 0.68 in all areas until July 1 when the coho season opened. The overall season total CPUE for chinook in combined areas in the Strait of Georgia was 0.86 with Area 17 having the highest CPUE (1.40) followed by Area 14 (0.83), Area 18 (0.76) and Area 13 (0.75). The high in Area 17 is somewhat deceiving since it really only reflects the situation prior to July 1 and, as previously mentioned, catch and effort compared to the northern areas (13, 14, 16) is markedly lower. Figure 4 shows how the CPUE for chinook changed throughout the season in combined areas in the Strait of Georgia.

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[1]British Columbia Catch Statistics, 1983, Canadian Department of Fisheries and Oceans. This figure includes all areas in the Strait of Georgia.

Table 1. Number of interviews and biological samples by sampling location for the 1983 Strait of Georgia Port Sampling Program.

Sampling Location	Number of Interviews	Number of fish Sampled	
		Coho	Chinook
Campbell River	649	179	1522
Quadra Island	81	-	1038
Comox	412	311	1129
Deep Bay	714	124	916
French Creek	578	960	1514
Nanaimo	383	233	1709
Silva Bay	66	-	955
Cowichan	4	-	49
Sidney & Victoria	205	27	368
On-board sampling	187	80	323
Total	3279	1914	9523

Table 2. Catch[a], sample size, and percent sampled by Statistical Area for 1983 Strait of Georgia troll-caught chinook.

	Statistical Area						
Month	13	14	16	17	18	29	Total
April							
Catch	8049	9198	1281	6405	229	1352	26514
Sample	833	1203	-	1134	-	133	3303
Percent	10.35	13.08	0	17.70	0	9.84	12.46
May							
Catch	8192	7713	570	5562	1125	116	23278
Sample	757	958	197	951	99	27	2989
Percent	9.24	12.42	34.56	17.10	8.80	23.28	12.84
June							
Catch	6276	4171	502	3822	479	289	15539
Sample	552	382	190	380	75	74	1653
Percent	8.80	9.16	37.58	9.94	15.66	25.61	10.64
July							
Catch	6532	4407	172	2657	528	321	14617
Sample	178	323	-	165	3	17	686
Percent	2.73	7.33	0	6.21	0.57	5.30	4.69
August							
Catch	3843	928	699	233	278	164	6145
Sample	48	138	8	10	-	-	204
Percent	1.25	14.87	1.14	4.29	0	0	6.35
September							
Catch	4086	1488	96	79	46	304	6099
Sample	86	176	7	-	-	-	269
Percent	2.10	11.83	7.29	0	0	0	4.41
Total							
Catch	36978	27905	3320	18758	2685	2546	92192
Sample	2454	3180	402	2640	177	251	9104
Percent	6.64	11.40	12.11	14.07	6.60	9.86	9.88

[a]Catch figures from Canadian Department of Fisheries and Oceans B.C. Catch Statistics 1983.

Table 3. Catch[a], sample size, and percent sampled by Statistical Area for 1983 Strait of Georgia troll-caught coho.

	Statistical Area						
Month	13	14	16	17	18	29	Total
July							
Catch	6150	18898	809	4234	721	1948	32760
Sample	103	925	-	202	7	8	1245
Percent	1.67	4.89	0	4.77	0.97	0.41	3.80
August							
Catch	2184	3391	239	352	183	567	6916
Sample	22	276	15	-	-	-	313
Percent	1.01	8.14	6.28	0	0	0	4.53
September							
Catch	1146	2096	55	115	7	93	3512
Sample	23	246	3	-	-	-	272
Percent	2.01	11.74	5.45	0	0	0	7.74
Total							
Catch	9480	24385	1103	4701	911	2608	43188
Sample	148	1447	18	202	7	8	1830
Percent	1.56	5.93	1.63	4.30	0.77	0.31	4.24

[a]Catch figures from Canadian Department of Fisheries and Oceans B.C. Catch Statistics 1983.

Table 4. Catch[a] per unit effort by Statistical Area and month for 1983 Strait of Georgia troll-caught chinook.

	Statistical Area						
Month	13	14	16	17	18	29	Total
April							
Catch	1133	4195	265	2480	45	164	8282
Effort(hrs)	629.00	2021.80	175.00	1173.90	63.00	154.50	4217.20
CPUE	1.80	2.07	1.51	2.11	0.71	1.06	1.96
May							
Catch	1044	3975	276	992	378	342	7007
Effort	1165.30	3926.70	313.50	850.60	252.30	322.40	6830.80
CPUE	0.90	1.01	0.88	1.17	1.50	1.06	1.03
June							
Catch	751	1626	312	487	-	340	3516
Effort	843.00	1888.20	460.50	457.00	-	466.50	4115.20
CPUE	0.89	0.86	0.68	1.07	-	0.73	0.85
July							
Catch	974	1749	54	307	24	82	3190
Effort	1447.30	5588.00	188.50	561.00	163.50	323.50	8271.80
CPUE	0.67	0.31	0.29	0.55	0.15	0.25	0.39
August							
Catch	255	379	63	4	21	41	763
Effort	1420.50	678.80	1039.50	14.00	136.50	528.80	3818.10
CPUE	0.18	0.56	0.06	0.29	0.15	0.80	0.20
September							
Catch	639	546	1	-	-	-	1186
Effort	850.00	839.40	11.00	-	-	-	1700.40
CPUE	0.75	0.65	0.09	-	-	-	0.70
Total							
Catch	4796	12470	971	4270	468	969	23944
Effort	6355.10	14942.90	2188.00	3056.50	615.30	1795.70	28953.50
CPUE	0.75	0.83	0.44	1.40	0.76	0.43	0.83

[a]Catch based on interviewed information only.

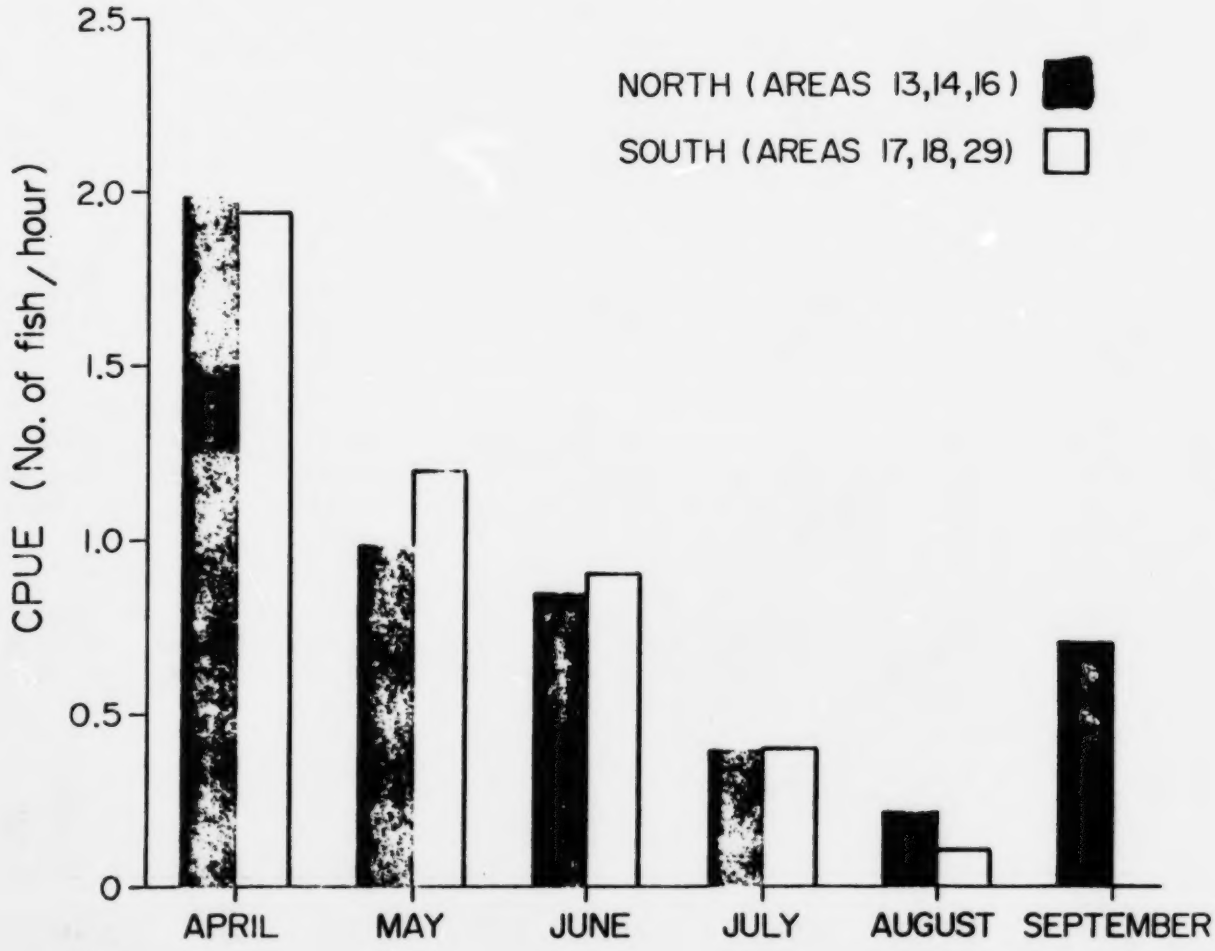

Fig. 3. Catch per Unit Effort in north and south Strait of Georgia for 1983 troll-caught chinook.

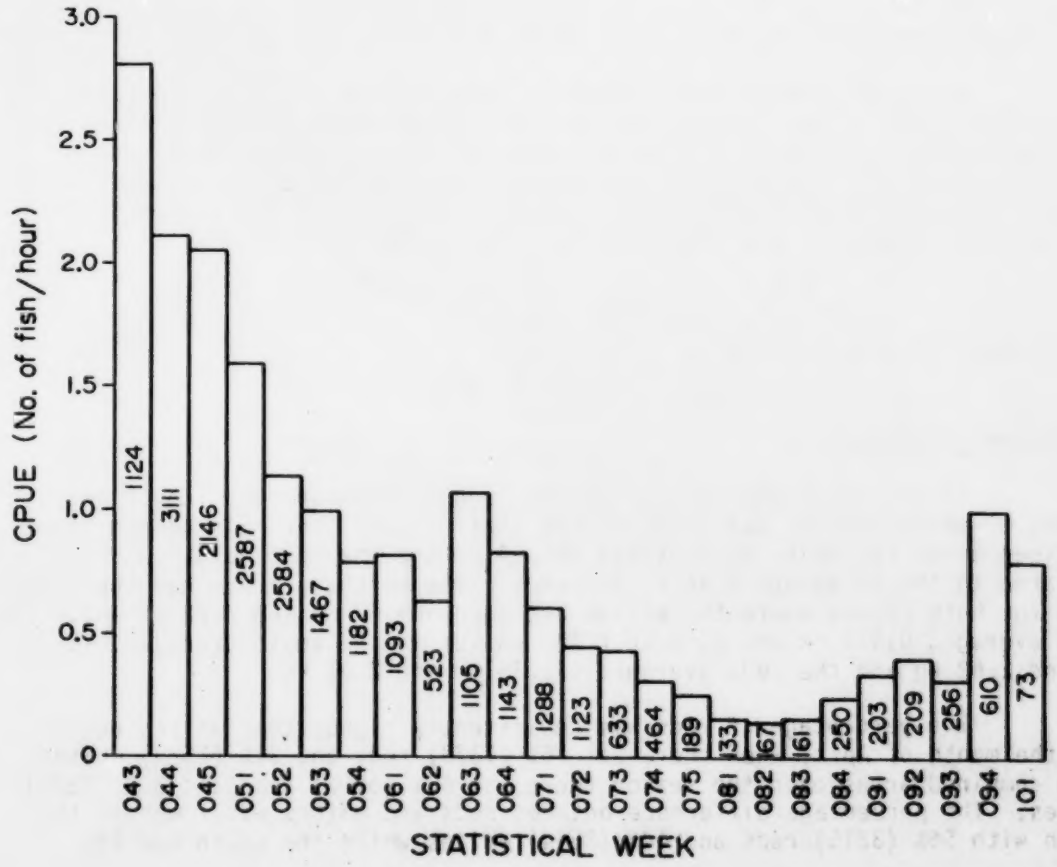

Fig. 4. Catch per Unit Effort of chinook by week for combined areas during the 1983 Strait of Georgia troll season.

The drop in CPUE for chinook after July 1 was due to the opening of the coho season and the shift in effort to that species. Similar to chinook, the CPUE for coho was higher in the north where total interviewed catch was 19674 pieces (738 pieces in south) and total effort was 12620 hours (2233 hours in south). Area 14 saw the highest CPUE in July (2.71) and remained consistently higher throughout the season with an overall CPUE of 2.36 compared to a combined CPUE of 0.40 from all other areas (Table 5; Fig. 5). The combined CPUE for coho from all areas in the Strait was 1.37. Figure 6 shows how the CPUE for coho changed through the season in combined areas.

NUMBER OF SHAKERS AND KEEPERS

The number of chinook shakers and keepers varied greatly between areas, however, certain trends seemed to exist. Generally the shaker/keeper ratio was very low at the beginning of the season (0.17-April - combined areas) and got higher (i.e. greater incidence of shakers) as the season progressed (Table 6; Fig. 7). In July, the shaker/keeper ratio was 2.88 in the south and 2.43 in the north. Over the season, the ratio was higher in the north (0.81) than in the south (0.69). The increase in the minimum size of chinook from 48 cm (19 in) to 53 cm (21 in) may have affected the number of shakers by showing an increase compared to previous years.

The total interviewed number of coho shakers prior to the start of the season (July 1) was 3751. The coho data show certain trends similar to chinook in most areas with a growing number of shakers through the season (Table 7; Fig. 8). The exception to this is Area 13 where the season's ratio of shakers/keepers was 0.25. Unlike chinook, the overall shaker/keeper ratio for coho was higher in the south (0.74) than in the north (0.31).

SIZE COMPOSITION OF CHINOOK

Length/Weight/Color

In all areas and throughout the season the mean fork length and weight of white chinook was greater than that of red. The mean length from combined areas for white chinook was 640.94 mm and the mean weight was 3.08 kg compared to 596.53 mm and 2.46 kg for reds. The northern areas had the larger fish for both colors where the whites averaged 649.47 mm and 3.22 kg while the reds averaged 614.2 mm and 2.76 kg. The whites in the south averaged 616.18 mm and 2.62 kg and the reds averaged 571.75 mm and 2.01 kg.

The percentage of reds was consistently higher than whites except for the month of April when there was 46% (1373) reds and 54% (1628) whites from combined areas over the season there was 62% (5406) reds and 38% (3271) whites. The percentage difference between reds and whites was lower in the north with 56% (3215) reds and 44% (2544) whites while the south had 75%

Table 5. Catch[a] per unit effort by Statistical Area and month for 1983 Strait of Georgia troll-caught coho.

	Statistical Area						
Month	13	14	16	17	18	29	Total
July							
Catch	840	16252	185	519	96	83	17975
Effort	1172.30	6007.30	199.50	573.00	75.50	233.00	8260.60
CPUE	0.72	2.71	0.93	0.91	1.27	0.36	2.18
August							
Catch	138	735	32	8	16	13	942
Effort	1635.00	618.00	1002.00	24.50	224.50	543.80	4047.80
CPUE	0.08	1.19	0.03	0.30	0.07	0.02	0.23
September							
Catch	703	786	3	-	-	3	1495
Effort	1016.00	893.40	76.50	-	-	559.00	2544.90
CPUE	0.69	0.88	0.04	-	-	0.01	0.59
Total							
Catch	1681	17773	220	527	112	99	20412
Effort	3823.30	7518.70	1278.00	597.50	300.00	1335.80	14853.30
CPUE	0.44	2.36	0.17	0.88	0.37	0.07	1.37

[a]Catch Based on interviewed information only.

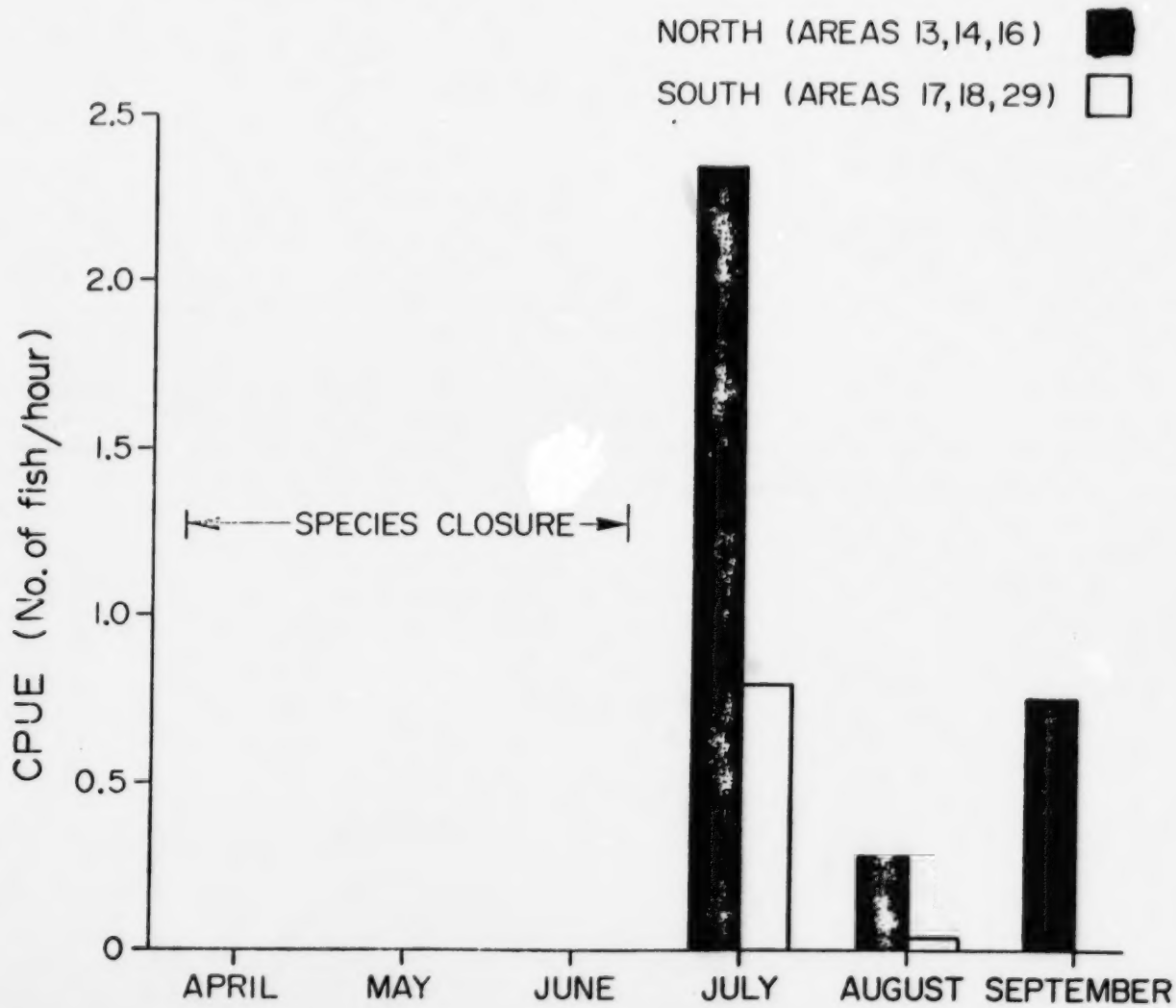

Fig. 5. Catch per Unit Effort in north and south Strait of Georgia for 1983 troll-caught coho.

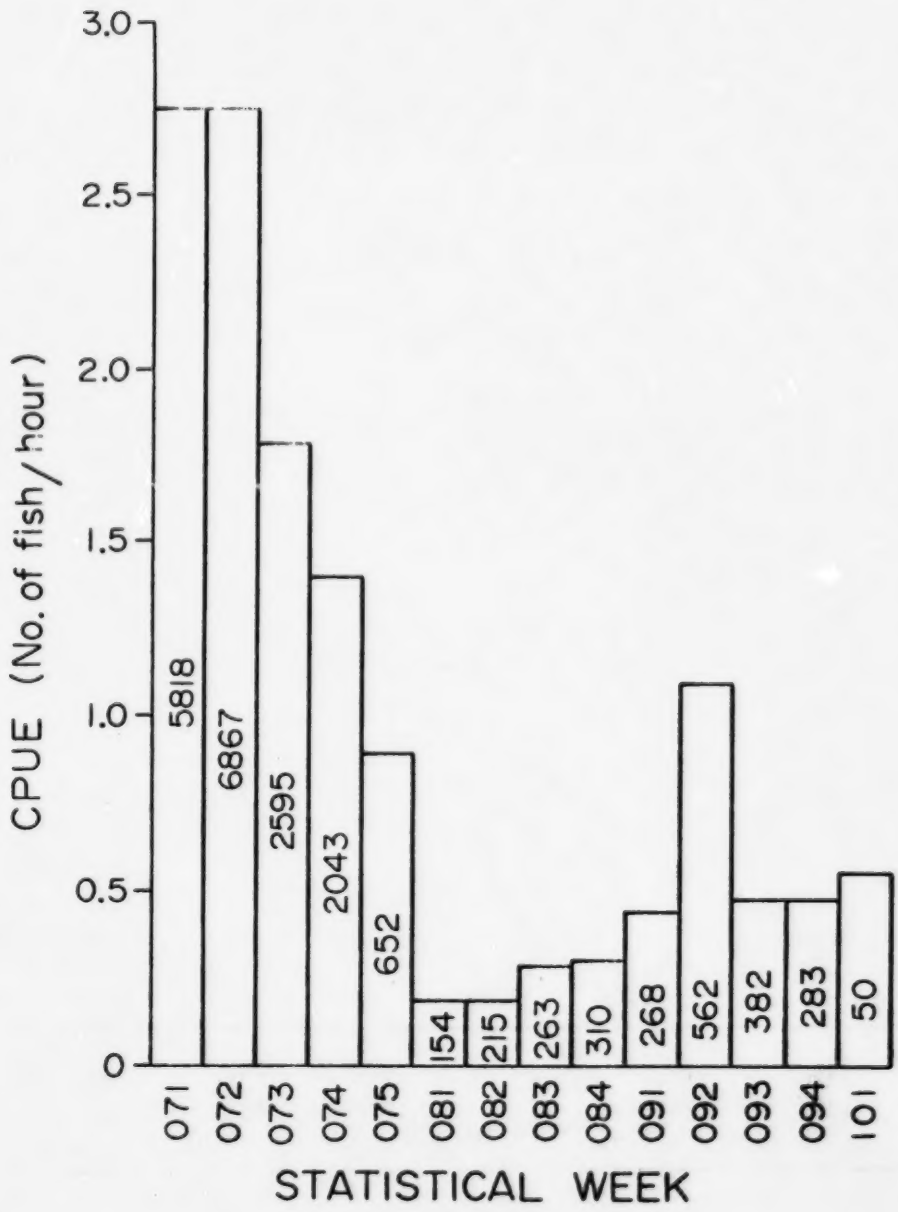

Fig. 6. Catch per Unit Effort of coho by week for combined areas during the 1983 Strait of Georgia troll season.

Table 6. Number of shakers and keepers by Statistical Area and month for 1983 Strait of Georgia troll-caught chinook.

	Statistical Area						
Month	13	14	16	17	18	29	Total
April							
Shakers	62	400	2	557	-	107	1128
Keepers	881	3131	145	2180	-	164	6501
Ratio	0.07	0.13	0.01	0.26	-	0.65	0.17
May							
Shakers	291	612	46	359	23	53	1384
Keepers	1140	4628	393	1161	236	284	7842
Ratio	0.26	0.13	0.12	0.31	0.10	0.19	0.18
June							
Shakers	86	1312	217	344	8	280	2247
Keepers	755	1644	306	591	187	383	3866
Ratio	0.11	0.80	0.71	0.58	0.04	0.73	0.58
July							
Shakers	686	7091	130	1082	87	119	9195
Keepers	1067	2126	62	328	22	97	3702
Ratio	0.64	3.34	2.10	3.30	3.95	1.23	2.48
August							
Shakers	410	1104	354	16	167	234	2285
Keepers	308	318	51	10	23	33	743
Ratio	1.33	3.47	6.94	1.60	7.26	7.09	3.08
September							
Shakers	785	1222	14	-	-	475	2496
Keepers	686	571	14	-	-	8	1279
Ratio	1.14	2.14	1.00	-	-	59.38	1.95
Total							
Shakers	2320	11741	763	2358	285	1268	18735
Keepers	4837	12418	971	4270	468	969	23933
Ratio	0.48	0.95	0.79	0.55	0.61	1.31	0.78

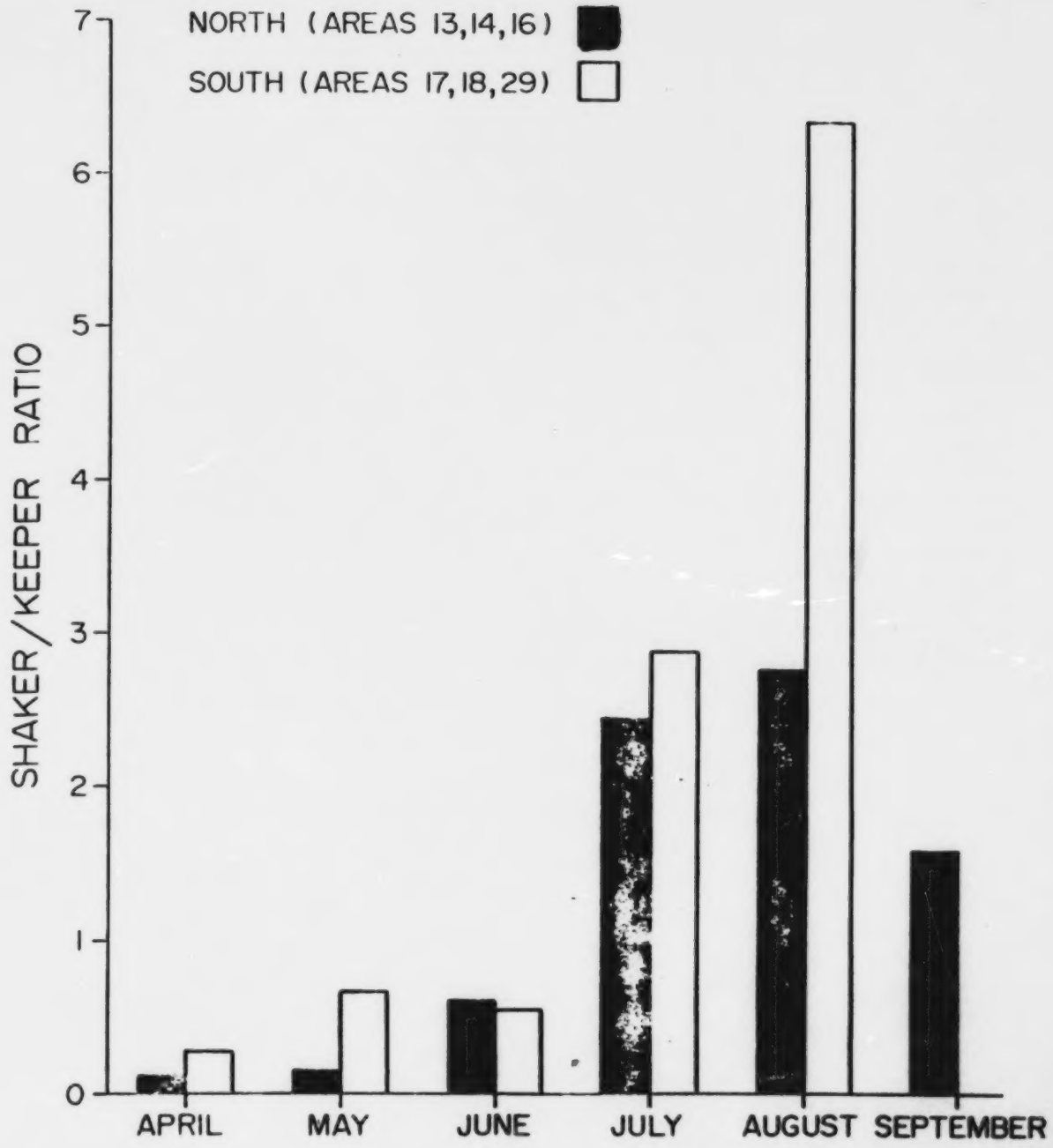

Fig. 7. Shaker/Keeper ratio in north and south Strait of Georgia for 1983 troll-caught chinook.

Table 7. Number of shakers and keepers by Statistical Area and month for 1983 Strait of Georgia troll-caught coho.

	Statistical Area						
Month	13	14	16	17	18	29	Total
July							
Shakers	195	3083	65	278	42	17	3680
Keepers	846	16252	185	519	96	83	17981
Ratio	0.23	0.19	0.35	0.54	0.44	0.20	0.20
August							
Shakers	75	897	114	17	64	19	1186
Keepers	183	739	32	8	16	13	991
Ratio	0.41	1.21	3.56	2.13	4.00	1.46	1.20
September							
Shakers	156	1513	15	-	-	106	1790
Keepers	706	786	3	-	-	3	1498
Ratio	0.22	1.92	5.00	-	-	35.33	1.19
Total							
Shakers	426	5493	194	295	106	142	6656
Keepers	1735	17777	220	527	112	99	20470
Ratio	0.25	0.31	0.88	0.56	0.95	1.43	0.33

Number of coho shakers before season opening (July 1) = 3751.

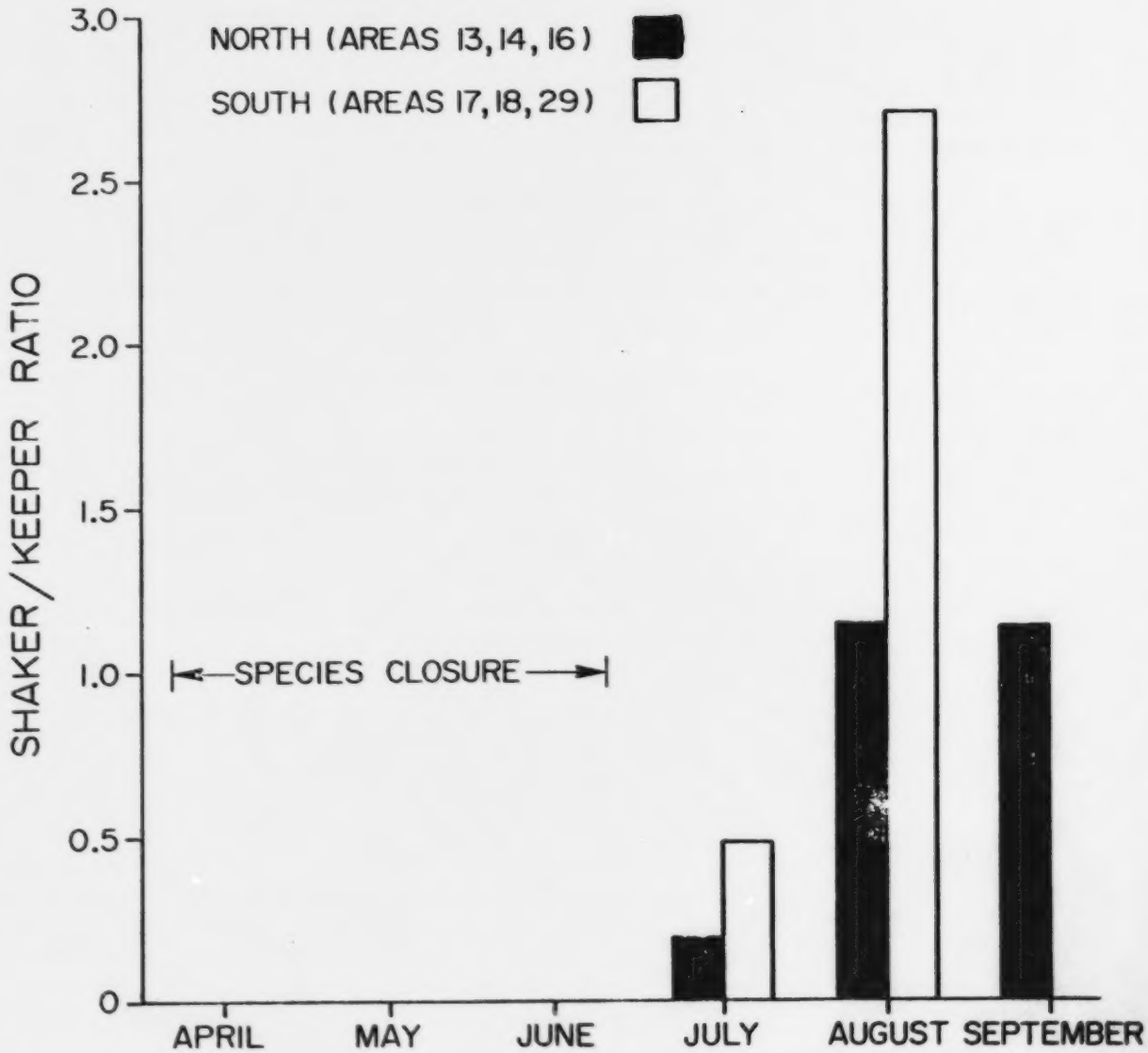

Fig. 8. Shaker/Keeper ratio in north and south Strait of Georgia for 1983 troll-caught coho.

(2187) reds and 25% (721) whites. Length summaries and weight summaries by color, month, and area are presented in Table 8, Figure 9 and in Table 9, Figure 10, respectively. Table 10 shows a comparison of percent color between the Port Sampling Data and B.C. Catch Statistics for Areas 13 and 14. Appendices B and C contain length/color and weight/color frequency tables.

SIZE COMPOSITION OF COHO

Length/Weight

Unlike chinook, there seemed to be no obvious length difference between coho in the northern and southern areas, although there were fewer samples taken from the south (Table 11; Fig. 11). In July, where there was a good sample size in the south (n=208), the mean length is greater (566.48 mm) than in the north (517.82 mm, n=1009). The combined-area mean length for the season was 552.49 mm and the largest mean length for the season occurred in Area 17 with a mean of 567.77 mm (n=202).

The weight data show that the northern fish were slightly larger than the southern fish. The mean weight for the northern coho (and the seasonal mean) was 1.42 kg and for the southern coho was 1.30 kg (Table 12; Fig. 12). Appendices D and E contain length/frequency and weight/frequency tables.

Table 8. Mean fork length (mm) and percent color by Statistical Area and month for 1983 Strait of Georgia troll-caught chinook.

		Area													
		13		14		16		17		18		29		Total	
Month		Red	White	Red	White	Red	White	Red	White	Red	White	Red	White	Red	White
	n	203	593	324	614	0	0	727	407	0	0	119	14	1373	1628
April	$\bar{x}$	620.20	652.55	587.50	610.62	-	-	553.59	582.06	-	-	556.39	589.64	571.68	618.57
	%	26	74	35	65	-	-	64	36	-	-	89	11	46	54
	n	381	359	657	357	122	75	771	101	63	17	21	6	2015	915
May	$\bar{x}$	631.72	687.24	613.92	647.69	627.17	669.60	574.36	675.50	687.14	720.00	578.81	596.67	604.87	669.08
	%	51	49	65	35	62	38	88	12	79	21	78	22	69	31
	n	425	154	294	98	151	39	292	91	20	5	36	27	1218	414
June	$\bar{x}$	651.66	708.38	592.91	642.24	647.68	673.72	582.73	674.29	621.25	708.00	552.64	600.00	617.03	747.36
	%	73	27	75	25	79	21	76	24	80	20	57	43	74	26
	n	160	75	226	50	0	0	120	39	2	1	3	8	511	173
July	$\bar{x}$	651.53	693.67	566.86	613.70	-	-	588.58	627.56	710.00	745.00	658.33	646.25	599.57	653.76
	%	68	32	82	18	-	-	75	25	67	33	27	73	75	25
	n	27	16	95	31	0	8	11	5	0	0	0	0	133	60
August	$\bar{x}$	692.59	671.56	576.58	612.74	-	671.88	579.55	716.00	-	-	-	-	600.38	644.92
	%	63	37	75	25	-	100	69	31	-	-	-	-	72	28
	n	56	24	91	47	3	4	0	0	0	0	0	0	150	75
September	$\bar{x}$	545.71	661.04	551.65	596.60	645.00	541.25	-	-	-	-	-	-	551.30	614.27
	%	70	30	66	34	43	57	-	-	-	-	-	-	67	33
	n	1252	1221	1687	1197	276	126	1923	643	85	23	179	55	5406	3271
Total	$\bar{x}$	636.62	672.74	593.42	623.90	638.59	666.94	568.69	613.59	672.18	718.48	556.98	603.73	596.53	640.94
	%	51	49	58	42	69	31	75	25	79	21	76	24	62	38

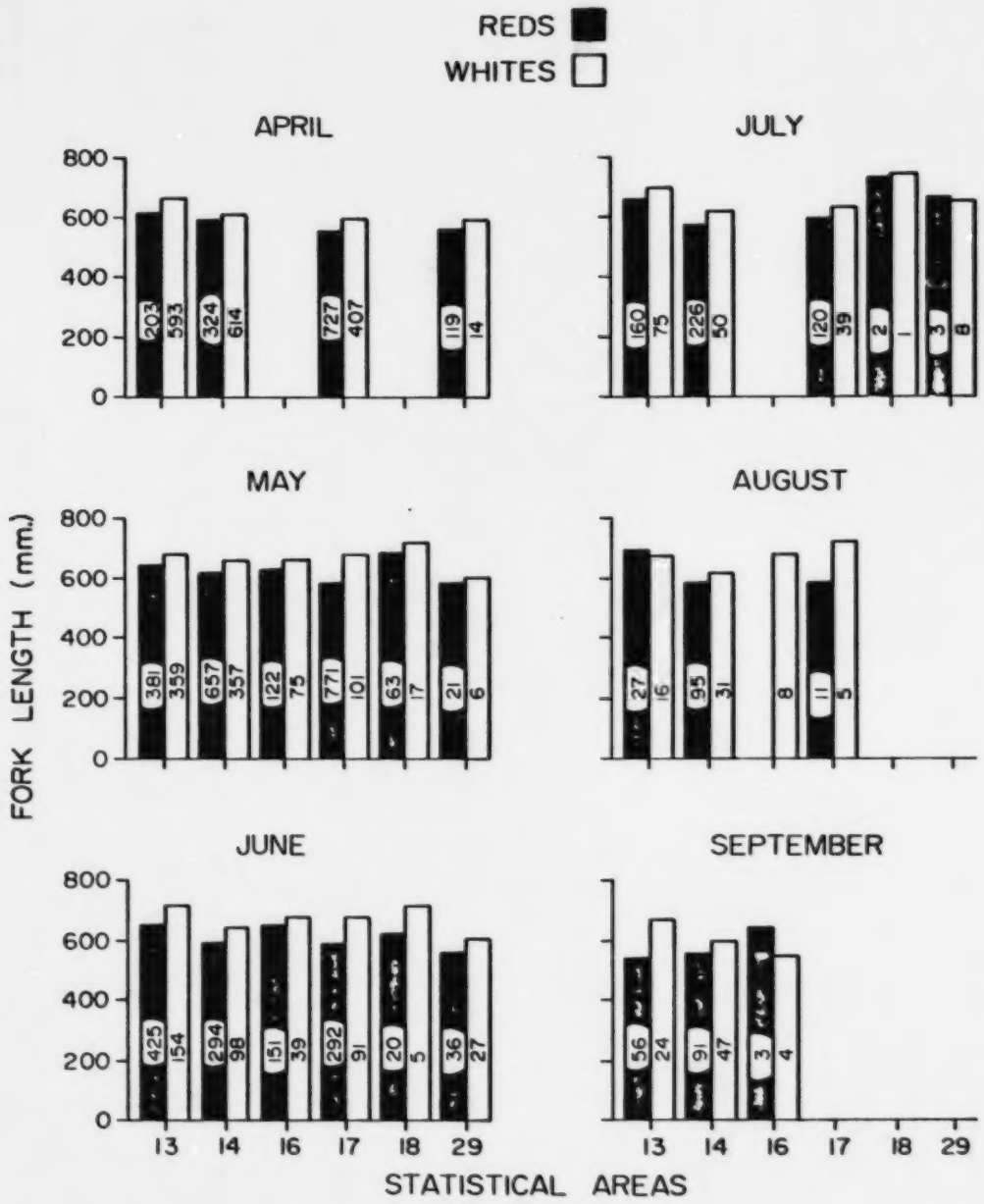

Fig. 9. Mean fork length (mm) by colour, month, and area for 1983 Strait of Georgia troll-caught chinook.

Table 9. Mean weight (kg) and percent colour by Statistical area and month for 1983 Strait of Georgia Troll-caught chinook.

		Statistical Area													
		13		14		16		17		18		29		Total	
Month		Red	White	Red	White	Red	White	Red	White	Red	White	Red	White	Red	White
April	n	203	593	324	614	0	0	727	407	0	0	119	14	1373	1628
	$\bar{x}$	2.61	3.18	2.28	2.41	-	-	1.76	2.06	-	-	1.77	2.27	2.01	2.60
	%	26	74	35	65	-	-	64	36	-	-	89	11	46	54
May	n	381	359	657	357	122	75	771	101	63	17	21	6	2015	915
	$\bar{x}$	2.89	4.01	2.44	2.95	2.88	3.45	1.96	3.36	3.92	3.88	1.93	2.23	2.41	3.46
	%	51	49	65	35	62	38	88	12	79	21	78	22	69	31
June	n	425	154	294	98	151	39	292	91	20	5	36	27	1218	414
	$\bar{x}$	3.41	4.76	2.33	3.67	3.53	3.89	2.19	3.75	2.62	3.90	2.28	2.50	2.83	4.04
	%	73	27	75	25	79	21	76	24	80	20	57	43	75	25
July	n	160	75	226	50	0	0	120	39	2	1	3	8	511	173
	$\bar{x}$	4.56	4.25	2.10	2.48	-	-	2.37	2.98	4.60	4.50	3.53	3.10	2.95	3.40
	%	68	32	82	18	-	-	75	25	67	33	27	73	75	25
August	n	27	16	95	31	0	8	11	5	0	0	0	0	133	60
	$\bar{x}$	4.77	3.59	2.27	2.82	-	4.50	2.28	4.34	-	-	-	-	2.78	3.38
	%	63	37	75	25	-	100	69	31	-	-	-	-	69	31
September	n	56	24	91	47	3	4	0	0	0	0	0	0	150	75
	$\bar{x}$	2.83	4.06	1.93	2.49	3.33	2.30	-	-	-	-	-	-	2.29	2.98
	%	70	30	66	34	43	57	-	-	-	-	-	-	67	33
Total	n	1252	1221	1687	1197	276	126	1923	643	85	23	179	55	5406	3271
	$\bar{x}$	3.27	3.71	2.31	2.69	3.24	3.60	1.95	2.58	3.63	3.91	1.92	2.50	2.46	3.08
	%	51	49	58	42	69	31	75	25	79	21	76	24	62	38

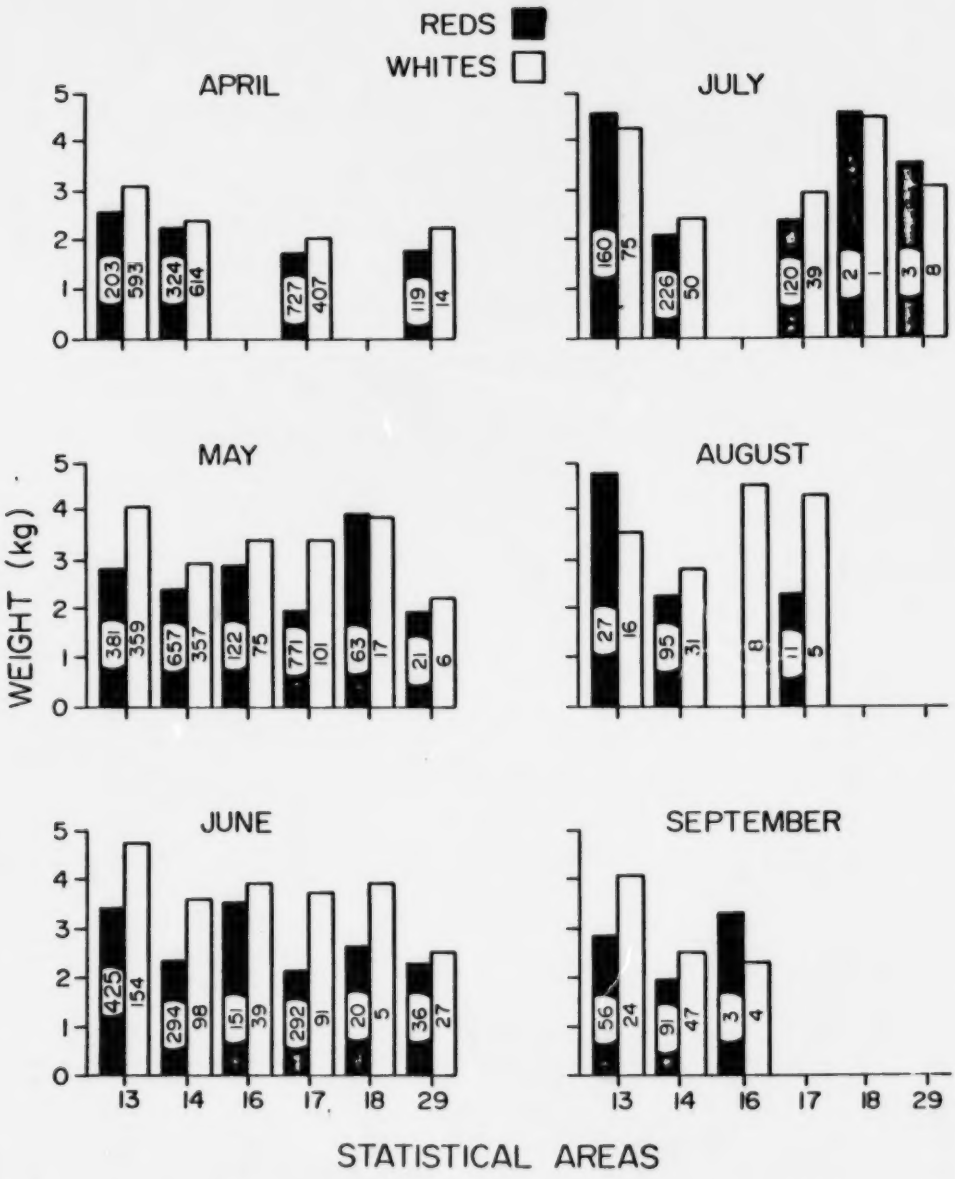

Fig. 10. Mean weight (kg) by colour, month, and area for 1983 Strait of Georgia troll-caught chinook.

Table 10. Comparison of percent color for chinook between 1983 Port Sampling Data and B.C. Catch Statistics[a] in Areas 13 and 14.

	Statistical Area					
	13		14		Total	
Month	No. Red	No. White	No. Red	No. White	No. Red	No. White
April						
From interviews	203	593	324	614	527	1207
%	26	74	35	65	30	70
From sales slips	6789	1260	8197	1001	14986	2261
%	84	16	89	11	87	13
May						
From interviews	381	359	657	357	1038	716
%	51	49	65	35	59	41
From sales slips	7663	528	7007	706	14670	1234
%	94	6	91	9	92	8
June						
From interviews	425	154	294	98	719	252
%	73	27	75	25	74	26
From sales slips	4858	1418	3723	448	8581	1866
%	77	23	89	11	82	18
July						
From interviews	160	75	211	43	371	118
%	68	32	83	17	76	24
From sales slips	4979	1557	3900	528	8879	2085
%	76	24	88	12	81	19
August						
From interviews	27	16	95	30	122	46
%	63	37	76	24	73	27
From sales slips	2991	906	860	68	3851	974
%	77	23	93	7	80	20
September						
From interviews	59	27	91	50	150	77
%	69	31	65	35	66	34
From sales slips	3810	1067	2539	182	6349	1249
%	78	22	93	7	84	16
Total						
From interviews	1255	1224	1672	1192	2927	2416
%	51	49	58	42	55	45
From sales slips	31090	6736	26226	2933	57316	9669
%	82	18	90	10	86	14

[a]From Canadian Department of Fisheries and Oceans B.C. Catch Statistics 1983.

Table 11. Mean fork length (mm) by Statistical Area and month for 1983 Strait of Georgia troll-caught coho.

Month		Area						Total
		13	14	16	17	18	29	
July	n	129	880	0	196	7	5	1217
	$\bar{x}$	540.50	514.15	-	570.20	527.86	475.00	525.89
August	n	17	297	15	6	0	0	335
	$\bar{x}$	571.18	532.53	541.67	488.33	-		534.10
September	n	23	235	3	0	0	0	261
	$\bar{x}$	612.82	552.56	636.67	-	-		558.84
Total	n	169	1412	18	202	7	5	1813
	$\bar{x}$	553.43	523.23	557.50	567.77	527.86	475.00	532.15

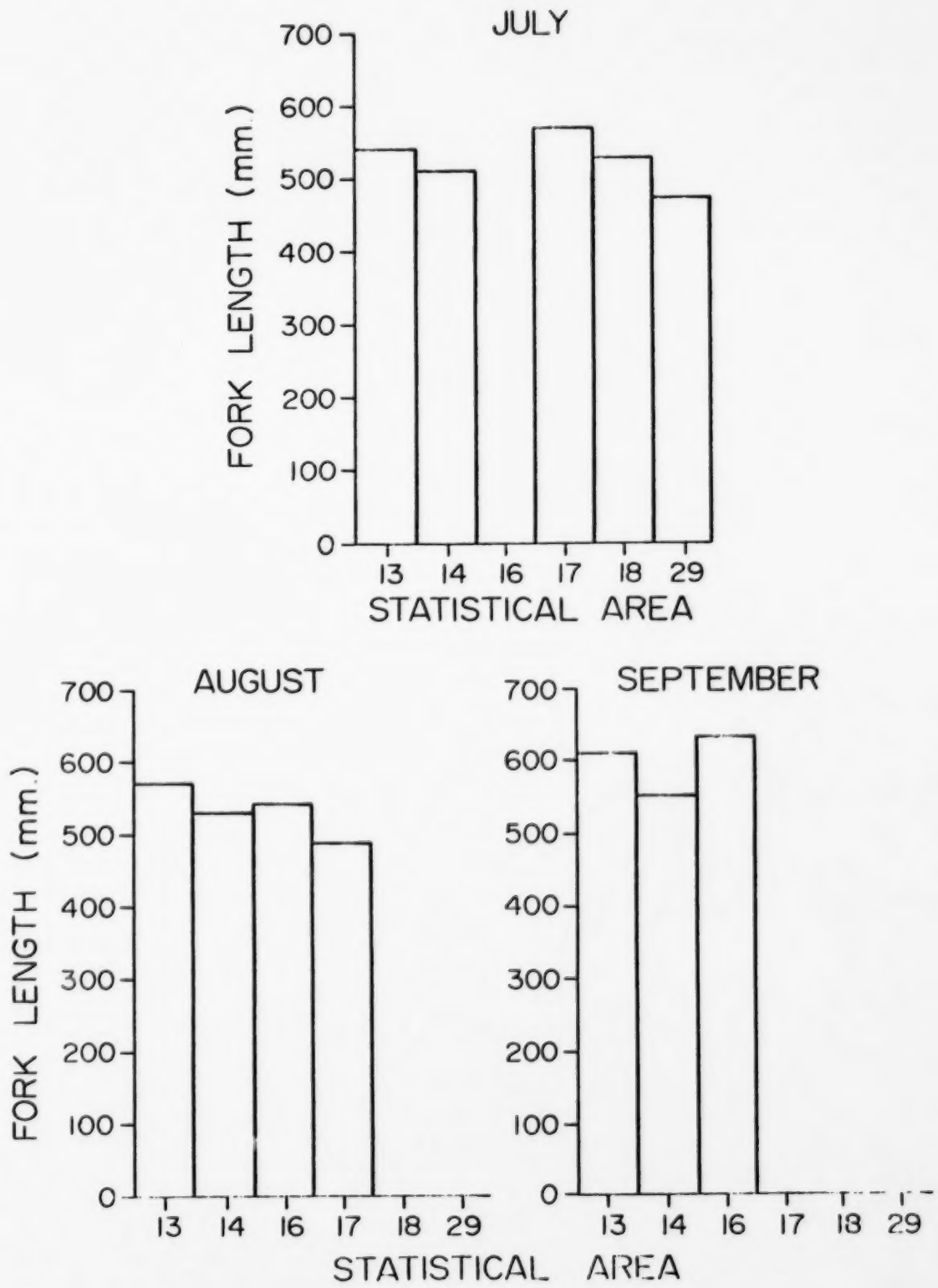

Fig. 11. Mean fork length (mm) by Statistical Area and month for 1983 Strait of Georgia troll-caught coho.

Table 12. Mean weight (kg) by Statistical Area and month for 1983 Strait of Georgia troll-caught coho.

Month		Statistical Area						
		13	14	16	17	18	29	Total
July	n	129	833	0	196	7	5	1170
	$\bar{x}$	1.61	1.33	-	1.31	1.41	1.08	1.36
August	n	17	297	15	6	0	0	325
	$\bar{x}$	2.28	1.61	1.76	1.20	-	-	1.69
September	n	23	232	3	0	0	0	258
	$\bar{x}$	2.62	1.50	2.90	-	-	-	1.62
Total	n	169	1362	18	202	7	5	1763
	$\bar{x}$	1.81	1.42	1.95	1.31	1.41	1.08	1.42

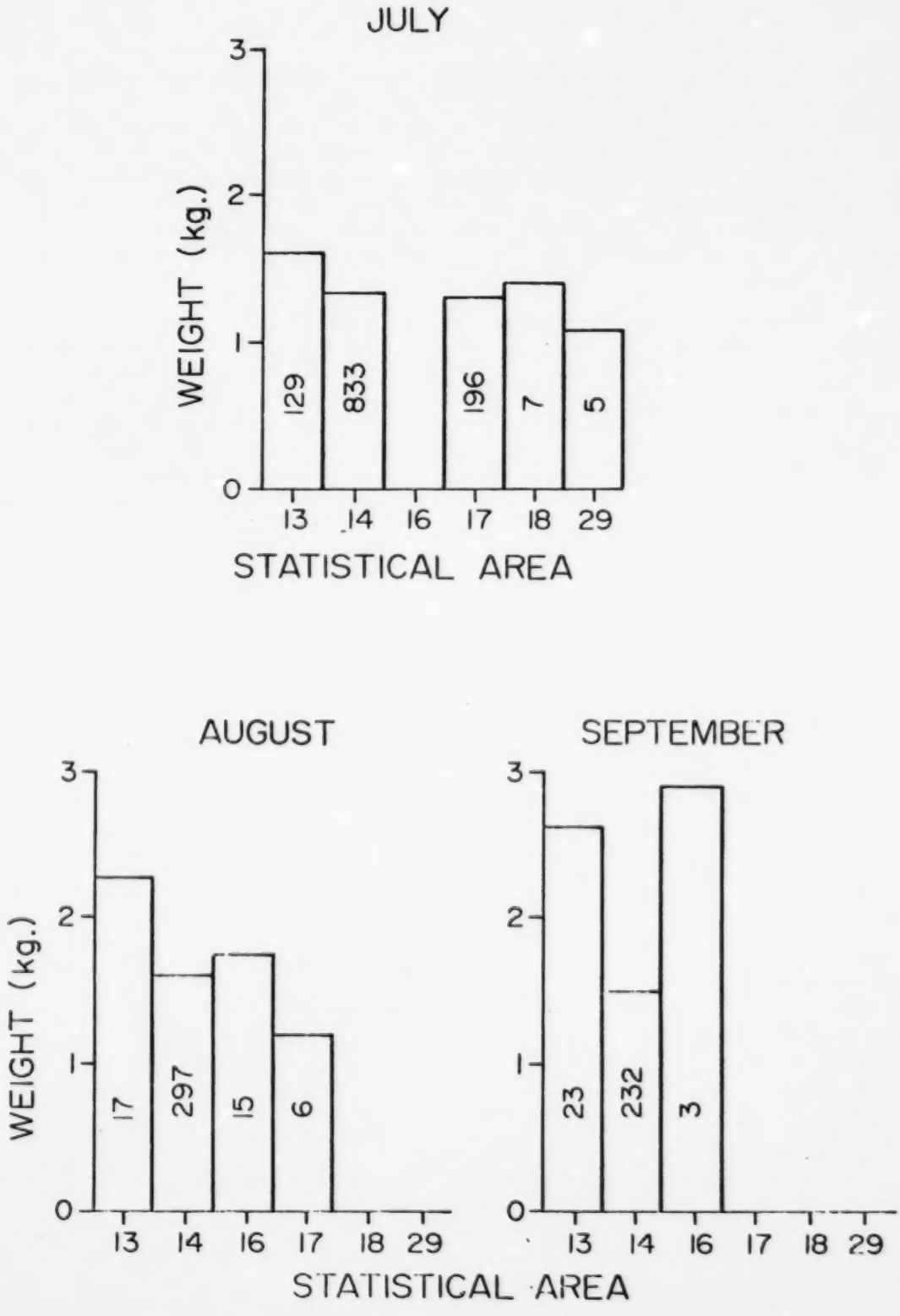

Fig. 12. Mean weight (kg) by Statistical Area and month for 1983 Strait of Georgia troll-caught coho.

AGE COMPOSITION OF CHINOOK

In all areas the greatest proportion of the catch was composed of age 3 (0.2) chinook (Table 13; Fig. 13). Throughout the season, the percentage of three year olds decreased while the percentage of two year olds (0.1) increased. Similarly, the percentage of four year olds (0.3) decreased through the season. In the northern areas (13 and 14) the percentage of two year olds was higher than that of three year olds in September. In all other areas the percentage of three year olds remained higher throughout the season. Overall these three age classes made up 79.3 percent of the catch (Table 14; Fig. 14).

Table 15 presents the mean length at age by month and area. In all age classes, regardless of month and where there was a representative sample taken ($\geq$100), the northern fish were larger than the southern. For age class 0.2, which made up 59.1 percent of the catch, there was a decrease in the difference between mean lengths of northern and southern areas as the season progressed. Even with this decrease, there was still a difference of ~15 mm in mean length in July when the last large sample was taken.

Table 13. Age composition[a] by month and area of 1983 Strait of Georgia troll-caught chinook.

Area	Month	Age	Catch	Percent
13	April	0.2	364	45.7
		0.3	173	21.7
		0.4	7	0.9
		1.1	1	0.1
		1.2	10	1.3
		1.3	7	0.9
		8.0[b]	234	29.4
	May	0.1	1	0.1
		0.2	355	48.0
		0.3	186	25.1
		0.4	6	0.8
		1.1	5	0.7
		1.2	6	0.8
		1.3	8	1.1
		8.0	173	23.4
	June	0.1	8	1.4
		0.2	289	49.9
		0.3	120	20.7
		0.4	7	1.2
		1.1	4	0.7
		1.2	9	1.6
		1.3	1	0.2
		8.0	141	24.3
	July	0.1	17	7.2
		0.2	103	43.8
		0.3	45	19.2
		0.4	1	0.4
		1.1	2	0.9
		1.2	1	0.4
		8.0	66	28.1
	August	0.1	6	14.0
		0.2	14	32.6
		0.3	5	11.6
		1.1	1	2.3
		1.3	2	4.6
		8.0	15	34.9
	September	0.1	38	44.2
		0.2	23	26.8
		0.3	5	5.8
		1.1	2	2.3
		8.0	18	20.9

Table 13 (cont'd)

Area	Month	Age	Catch	Percent
14	April	0.2	664	68.2
		0.3	160	16.5
		0.4	5	0.5
		1.2	4	0.4
		8.0	140	14.4
	May	0.1	2	0.2
		0.2	624	61.5
		0.3	217	21.4
		0.4	5	0.5
		1.1	1	0.1
		1.2	6	0.6
		1.3	2	0.2
		8.0	157	15.5
	June	0.1	29	7.4
		0.2	257	65.6
		0.3	37	9.4
		1.1	5	1.3
		1.2	2	0.5
		8.0	62	15.8
	July	0.1	100	36.2
		0.2	117	42.4
		0.3	10	3.6
		1.1	3	1.1
		1.2	1	0.4
		1.3	1	0.4
		8.0	44	15.9
	August	0.1	47	37.3
		0.2	44	34.9
		0.3	7	5.6
		1.1	1	0.8
		8.0	27	21.4
	September	0.1	79	54.9
		0.2	31	21.5
		0.3	3	2.1
		0.4	1	0.7
		1.1	1	0.7
		0.8	29	20.1
16	May	0.2	93	47.2
		0.3	49	24.9
		0.4	1	0.5
		1.2	4	2.0
		8.0	50	25.4

Table 13 (cont'd)

Area	Month	Age	Catch	Percent
16	June	0.1	11	5.8
		0.2	94	49.5
		0.3	43	22.6
		0.4	1	0.5
		1.1	4	2.1
		1.2	4	2.1
		8.0	33	17.4
	August	0.1	2	25.0
		0.2	2	25.0
		0.3	2	25.0
		8.0	2	25.0
	September	0.1	3	42.9
		0.2	4	57.1
17	April	0.1	1	0.1
		0.2	882	77.8
		0.3	99	8.7
		0.4	1	0.1
		1.2	7	0.6
		1.3	3	0.3
		8.0	141	12.4
	May	0.1	1	0.1
		0.2	634	72.2
		0.3	89	10.1
		0.4	2	0.2
		1.1	2	0.2
		1.2	4	0.5
		1.3	2	0.2
		8.0	145	16.5
	June	0.1	18	4.7
		0.2	247	64.5
		0.3	48	12.6
		0.4	2	0.5
		1.1	4	1.0
		1.2	4	1.0
		1.3	1	0.3
		8.0	59	15.4
	July	0.1	15	9.4
		0.2	100	62.9
		0.3	13	8.2
		1.1	3	1.9
		8.0	28	17.6

Table 13 (cont'd)

Area	Month	Age	Catch	Percent
17	August	0.1	4	25.0
		0.2	7	43.7
		0.3	1	6.3
		0.4	1	6.3
		8.0	3	18.7
18	May	0.2	23	28.8
		0.3	33	41.3
		0.4	1	1.2
		1.1	1	1.2
		1.2	3	3.8
		1.3	1	1.2
		8.0	18	22.5
	June	0.2	14	56.0
		0.3	3	12.0
		8.0	8	32.0
	July	0.2	2	66.7
		8.0	1	33.3
29	April	0.2	101	75.9
		0.3	12	9.0
		1.1	1	0.8
		8.0	19	14.3
	May	0.2	22	81.5
		0.3	2	7.4
		8.0	3	11.1
	June	0.1	8	12.5
		0.2	42	65.6
		0.3	4	6.2
		1.2	1	1.6
		8.0	9	14.1
	July	0.1	2	18.2
		0.2	3	27.3
		0.3	3	27.3
		0.4	1	9.0
		8.0	2	18.2

[a]Ages used are from total and random catch samples only.

[b]8.0=scales unreadable or no scale sample taken.

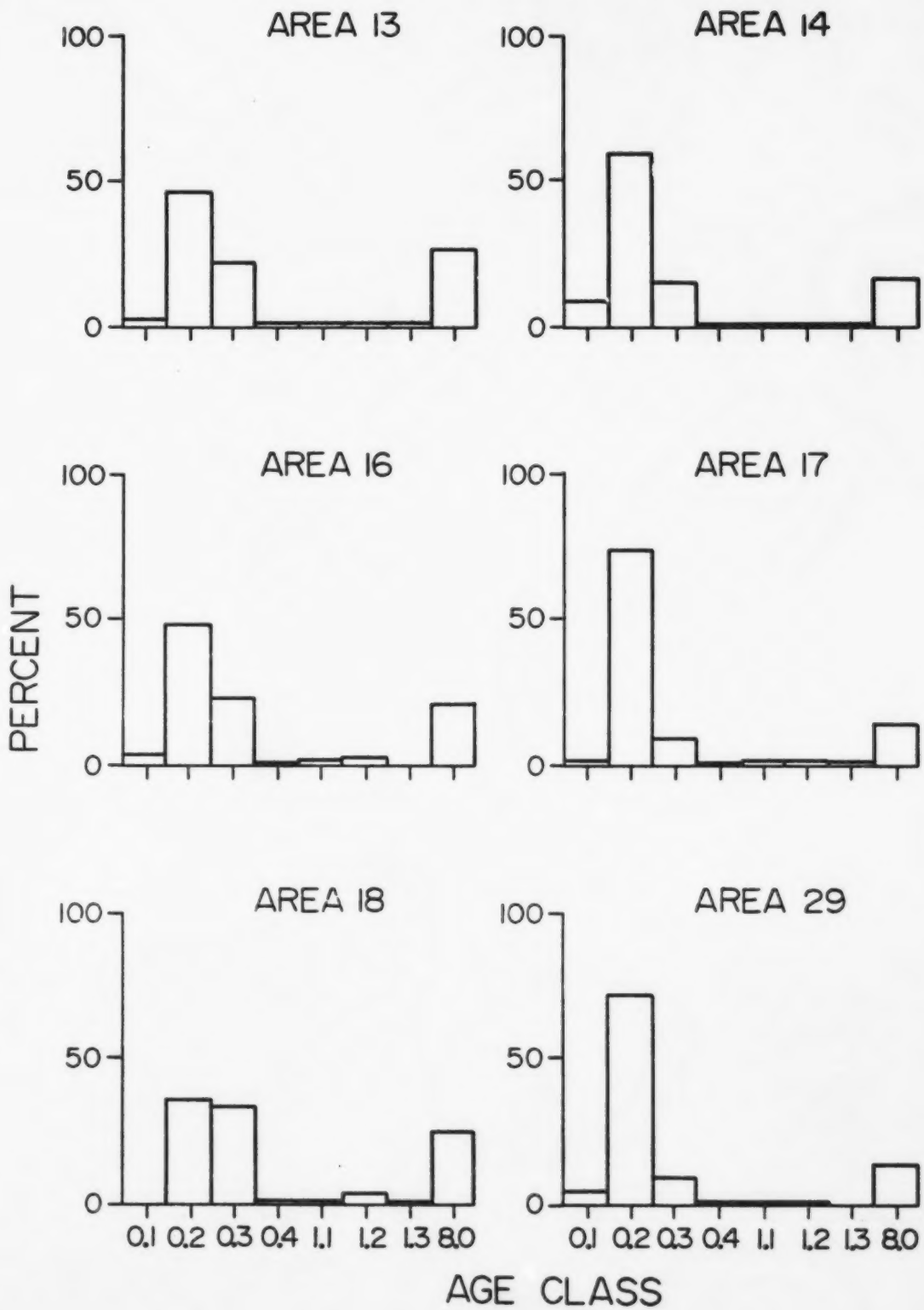

Fig. 13. Age composition by area for 1983 Strait of Georgia troll-caught chinook.

Table 14. Age composition[a] summary by area for 1983 Strait of Georgia troll-caught chinook.

Area	Age	Catch	Percent
13	0.1	70	2.8
	0.2	1148	46.3
	0.3	534	21.6
	0.4	21	0.9
	1.1	15	0.6
	1.2	26	1.0
	1.3	18	0.7
	8.0[b]	647	26.1
14	0.1	257	8.8
	0.2	1737	59.4
	0.3	434	14.8
	0.4	11	0.4
	1.1	11	0.4
	1.2	13	0.4
	1.3	3	0.1
	8.0	459	15.7
16	0.1	16	4.0
	0.2	193	48.0
	0.3	94	23.4
	0.4	2	0.5
	1.1	4	1.0
	1.2	8	2.0
	8.0	85	21.1
17	0.1	39	1.5
	0.2	1870	72.8
	0.3	250	9.7
	0.4	6	0.2
	1.1	9	0.4
	1.2	15	0.6
	1.3	6	0.2
	8.0	376	14.6
18	0.2	39	36.1
	0.3	36	33.4
	0.4	1	0.9
	1.1	1	0.9
	1.2	3	2.8
	1.3	1	0.9
	8.0	27	25.0

Table 14 (cont'd)

Area	Age	Catch	Percent
29	0.1	10	4.3
	0.2	168	71.5
	0.3	21	9.0
	0.4	1	0.4
	1.1	1	0.4
	1.2	1	0.4
	8.0	33	14.0
Combined	0.1	392	4.5
	0.2	5155	59.1
	0.3	1369	15.7
	0.4	42	0.5
	1.1	41	0.5
	1.2	66	0.7
	1.3	28	0.3
	8.0	1627	18.7
	Total	8720	100.0

[a]Ages used are from total and random catch samples only.
[b]8.0=scales unreadable or no scale sample taken.

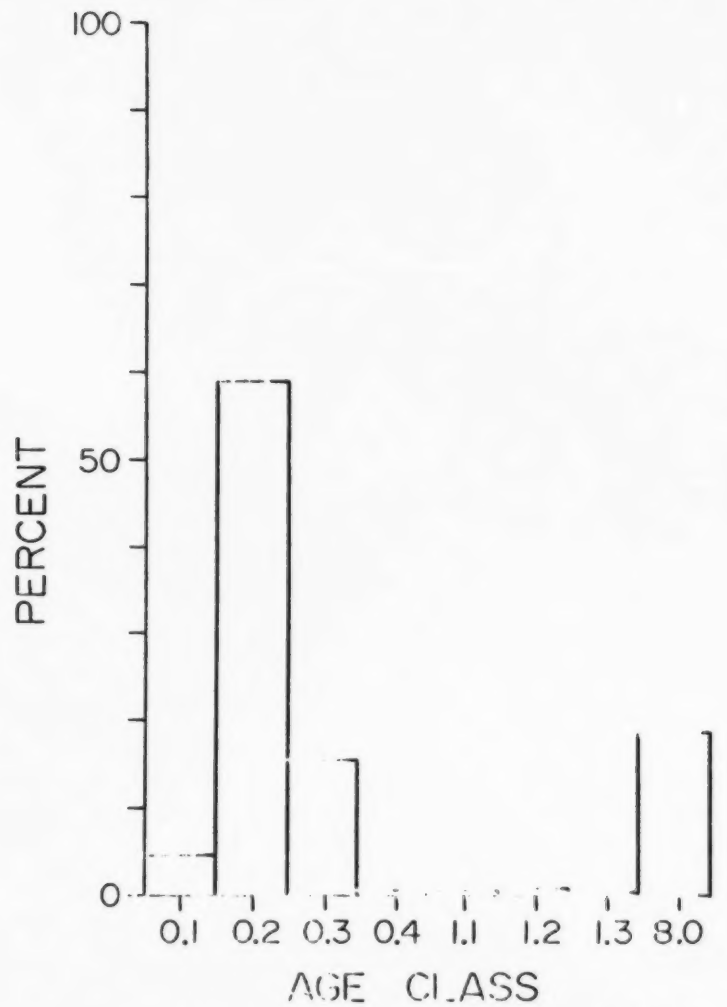

Fig. 14. Age composition of 1983 Strait of Georgia troll-caught chinook - combined areas.

Table 15. Mean length (mm) at age[a] by month and area for 1983 Strait of Georgia troll-caught Chinook.

Area		Age 0.1	0.2	0.3	0.4	1.1	1.2	1.3	8.0[b]	Total
13	n	0	364	173	7	1	10	7	234	796
April	$\bar{x}$	-	602	726	733	490	659	804	643	645
	%	-	45.7	21.7	0.9	0.1	1.3	0.9	29.4	100.0
	n	1	355	186	6	5	6	8	173	740
May	$\bar{x}$	440	609	749	771	490	637	796	668	661
	%	0.1	48.0	25.1	0.8	0.7	0.8	1.1	23.4	100.0
	n	8	289	120	7	4	9	1	141	579
June	$\bar{x}$	498	627	787	827	535	720	790	660	671
	%	1.4	49.9	20.7	1.2	0.7	1.6	0.2	24.3	100.0
	n	17	103	45	1	2	1	0	66	235
July	$\bar{x}$	543	652	786	730	530	670	-	659	671
	%	7.2	43.9	19.1	0.4	0.9	0.4	-	28.1	100.0
	n	6	14	5	0	1	0	2	15	43
August	$\bar{x}$	540	670	842	-	500	-	905	703	680
	%	13.9	32.6	11.6	-	2.3	-	4.7	34.9	100.0
	n	38	23	5	0	2	0	0	18	86
September	$\bar{x}$	521	680	728	-	495	-	-	571	587
	%	44.2	26.7	5.8	-	2.3	-	-	21.0	100.0
14	n	0	664	160	5	0	4	0	140	973
April	$\bar{x}$	-	580	697	800	-	615	-	624	606
	%	-	68.2	16.5	0.5	-	0.4	-	14.4	100.0
	n	2	624	217	5	1	6	2	157	1014
May	$\bar{x}$	527	598	715	826	490	595	775	637	631
	%	0.2	61.5	21.4	0.5	0.1	0.6	0.2	15.5	100.0
	n	29	257	37	0	5	2	0	62	392
June	$\bar{x}$	498	609	747	-	538	600	-	597	597
	%	7.4	65.6	9.4	-	1.3	0.5	-	15.8	100.0
	n	100	117	10	0	3	1	1	44	276
July	$\bar{x}$	510	610	789	-	567	730	785	606	580
	%	36.2	42.4	3.6	-	1.1	0.4	0.4	15.9	100.0
	n	47	44	7	0	1	0	0	27	126
August	$\bar{x}$	539	619	694	-	530	-	-	599	587
	%	37.3	34.9	5.6	-	0.8	-	-	21.4	100.0
	n	79	31	3	1	1	0	0	29	144
September	$\bar{x}$	541	650	757	800	540	-	-	578	576
	%	54.9	21.5	2.1	0.7	0.7	-	-	20.1	100.0

Table 15 (cont'd).

Area		Age 0.1	0.2	0.3	0.4	1.1	1.2	1.3	8.0[b]	Total
16	n	0	93	49	1	0	4	0	50	197
May	$\bar{x}$	-	609	737	730	-	673	-	664	655
	%	-	47.2	24.9	0.5	-	2.0	-	25.4	100.0
	n	11	94	43	1	4	4	0	33	190
June	$\bar{x}$	495	609	771	880	508	635	-	705	656
	%	5.8	49.5	22.6	0.5	2.1	2.1	-	17.4	100.0
	n	2	2	2	0	0	0	0	2	8
August	$\bar{x}$	525	745	870	-	-	-	-	550	673
	%	25.0	25.0	25.0	-	-	-	-	25.0	100.0
	n	3	4	0	0	0	0	0	0	7
September	$\bar{x}$	507	648	-	-	-	-	-	-	588
	%	42.9	57.1	-	-	-	-	-	-	100.0
17	n	1	882	99	1	0	7	3	141	1134
April	$\bar{x}$	500	552	680	650	-	556	683	573	566
	%	0.1	77.8	8.7	0.1	-	0.6	0.3	12.4	100.0
	n	1	634	89	2	2	4	2	145	879
May	$\bar{x}$	480	570	703	945	510	572	760	588	587
	%	0.1	72.2	10.1	0.2	0.2	0.5	0.2	16.5	100.0
	n	18	247	48	2	4	4	1	59	383
June	$\bar{x}$	495	592	760	875	498	603	740	594	609
	%	4.7	64.5	12.6	0.5	1.0	1.0	0.3	15.4	100.0
	n	15	100	13	0	3	0	0	28	159
July	$\bar{x}$	531	614	703	-	535	-	-	587	612
	%	9.4	62.9	8.2	-	1.9	-	-	17.6	100.0
	n	4	7	1	1	0	0	0	3	16
August	$\bar{x}$	560	698	720	775	-	-	-	490	631
	%	25.0	43.8	6.2	6.2	-	-	-	18.8	100.0
18	n	0	23	33	1	1	3	1	18	80
May	$\bar{x}$	-	603	737	800	580	680	760	664	658
	%	-	28.7	41.2	1.3	1.3	3.7	1.3	22.5	100.0
	n	0	14	3	0	0	0	0	8	25
June	$\bar{x}$	-	586	765	-	-	-	-	553	597
	%	-	56.0	12.0	-	-	-	-	32.0	100.0
	n	0	2	0	0	0	0	0	1	3
July	$\bar{x}$	-	710	-	-	-	-	-	750	723
	%	-	66.7	-	-	-	-	-	33.3	100.0

Table 15 (cont'd).

Area		Age 0.1	0.2	0.3	0.4	1.1	1.2	1.3	8.0[b]	Total
29	n	0	101	12	0	1	0	0	19	133
April	$\bar{x}$	-	549	648	-	530	-	-	551	558
	%	-	75.9	9.0	-	0.8	-	-	14.3	100.0
	n	0	22	2	0	0	0	0	3	27
May	$\bar{x}$	-	574	715	-	-	-	-	570	584
	%	-	81.5	7.4	-	-	-	-	11.1	100.0
	n	8	42	4	0	0	1	0	9	64
June	$\bar{x}$	489	585	703	-	-	510	-	621	584
	%	12.5	65.6	6.3	-	-	1.6	-	12.7	100.0
	n	2	3	3	1	0	0	0	2	11
July	$\bar{x}$	580	613	767	610	-	-	-	630	652
	%	18.2	27.3	27.3	9.0	-	-	-	18.2	100.0
Combined	n	1	2011	444	13	2	21	10	534	3036
April	$\bar{x}$	500	570	703	752	510	616	768	616	602
	%	0.1	66.2	14.6	0.4	0.1	0.7	0.3	17.6	100.0
	n	4	1751	576	15	9	23	13	546	2937
May	$\bar{x}$	494	591	727	812	560	627	784	637	628
	%	0.1	59.6	19.6	0.5	0.3	0.8	0.5	18.6	100.0
	n	74	943	255	10	17	20	2	312	1633
June	$\bar{x}$	496	609	772	842	521	657	765	636	636
	%	4.6	57.8	15.6	0.6	1.0	1.2	0.1	19.1	100.0
	n	134	325	71	2	8	2	1	141	684
July	$\bar{x}$	518	625	770	670	546	700	785	628	619
	%	19.6	47.5	10.4	0.3	1.1	0.3	0.1	20.6	100.0
	n	59	67	15	1	2	0	2	47	193
August	$\bar{x}$	540	642	769	775	515	-	905	623	618
	%	30.6	34.7	7.8	0.5	1.0	-	1.0	24.4	100.0
	n	120	58	8	1	3	0	0	47	237
September	$\bar{x}$	534	662	739	800	510	-	-	575	581
	%	50.6	24.5	3.4	0.4	1.3	-	-	19.8	100.0
	n	392	5155	1369	42	41	66	28	1627	8720
Total	$\bar{x}$	522	590	730	793	533	635	786	627	618
	%	4.5	59.1	15.7	0.5	0.5	0.8	0.3	18.6	100.0

[a]Ages used are from total and random catch samples only.
[b]8.0=scales unreadable or no scale sample taken.

ACKNOWLEDGMENTS

The authors would like to express their thanks to the many individuals who assisted in the collection and handling of the data and to the ageing unit of the Pacific Biological Station for reading the thousands of scales. Above all, we thank the commercial salmon trollers in the Strait of Georgia for their cooperation.

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The sampling manual for this program was based on a more detailed manual issued by J. E. Sager and Associates for the tag recovery program and we thank them for their cooperation in this and their help in establishing the port sampling program.

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Appendix A

1983 Port Sampling Manual

Pacific Biological Station

Nanaimo, British Columbia

March 1983

Contact Personnel

Louis Lapi, Project Biologist	
Pacific Biological Station	756-7144
Home	245-2823
Bob Ball, Project Technician	
Pacific Biological Station	756-7245
Home	753-3687
Ted Carter, Project Technician	
Pacific Biological Station	756-7252
Home	468-9247 (After May 5/83)
Keith Robinson, Supervisor	
Parksville	248-9627
Lynn Chapman, Supervisor	
Qualicum Beach	752-6103
Pacific Biological Station	756-7000

After station hours (08:00-16:15) call Louis, Bob, or Ted collect.

SALMON SAMPLING MANUAL

INTRODUCTION

The salmon sampling program was designed to sample the commercial troll catch of chinook and coho salmon in the Gulf of Georgia for biological data and catch data. The biological data will provide information necessary in the management and enhancement of salmonids while the catch data will give an indication of catch per unit of effort. The overall goal of the program is to sample between 7 and 10 percent of the commercial catch of chinook and coho in addition to interviewing the fishing vessels for catch and effort information.

The purpose of this manual is to:

1) Provide the sampler with a general overview of the sampling program.

2) Provide the sampler with a detailed, easy-to-follow guide to biological sampling procedures to ensure a standard method of collection of data.

3) Provide the sampler with a reference to help in any problems he/she may encounter.

The success of this program depends largely on the accuracy and precision of the sampling by the field personnel. Please use this manual as a reference but do not hesitate to phone one of the contact personnel if problems arise (Page ii).

1. COMMERCIAL SAMPLING

Table 1 outlines the sampling locations which will be covered by each major headquarters. Sampling will provide the basic data required to identify the origin and establish the age/size composition of chinook and coho salmon occupying diverse geographic locations.

At each location, samplers will work closely with plant personnel in order to obtain random catch samples for biological sampling data. Catches may arrive by packers, individual troll vessels, and trucks. Samples will be taken as the fish are being graded by species or into various size and colour categories. Preference must be given to landings from individual vessesl with catches which originate from a single catch location. Therefore, prior to taking a sample, the sampler must first interview the vessel skipper to obtain the necessary information.

Table 1. Sampling locations covered by major headquarters.

Headquarters	Locations covered
Campbell River	Campbell River Quadra Island
Courtenay	Courtenay Comox
Parksville	Deep Bay French Creek
Nanaimo	Nanaimo Gabriola Island Cowichan Sidney (possible)

2. INTERVIEW PROCEDURES

A brief interview with the skipper of each vessel is necessary to obtain the most accurate information on catch location and trip duration (mainly day boats). Although brief, these interviews are important so the interviewer should express interest in details of the fisherman's trip and be prepared to answer any questions regarding salmon biology (if possible). Generally, the more interest expressed by the interviewer will result in greater cooperation by the skipper. The catch information and areas fished are crucial and should be obtained to as accurate a degree as possible. In the case where a boat has fished in more than one location, an estimate of time spent or number of fish caught by locality is important and samples taken should be coded accordingly. If greater than 90 percent of the catch is from one location then this can be regarded as being from one area. If you are not familiar with the areas the fishermen is discussing, refer to the chart provided and have the fishermen point out the location. All catch information (trip length and fishing locations) and comments will be recorded on the interview forms.

Important: All of this data is strictly confidential and should not be discussed with anyone.

2.1. Field notebook

An important part of catch sample data recording relates to the

information contained in the field notebook. Entries in this book will include the following:

A) Sample date

B) Vessel name, license, and skipper's name (if possible)

C) Catch locations (to as accurate a degree as possible)

D) Trip duration

E) The number of fish sampled and weight by grade and species

F) If chinook and coho were not the target species then indicate target

G) Any pertinent comments

The information contained in this book is unique because it contains information that is not available to that contained in the interview or weekly summary forms. This book is an important reference for assessing average species weights and the grade composition. As a result, it must be clearly labelled and accurately recorded. Due to the speed normally required in recording this data, abbreviations have been used to describe fishing areas and grades. Each sampler must ensure that these abbreviations are legible and understandable. Always assume the person who will eventually use this book is not familiar with your coding, therefore ensure that it is in a useable state. The information should continue in a sequential week basis. The outside cover of each book should include the statistical weeks involved throughout the book and the sampler(s) name(s).

2.2. Daily and weekly summary forms

Daily and weekly summaries must be completed at each sampling location. Samplers will be responsible for phoning in the daily summaries and either phoning or mailing in the weekly summaries to the Biological Station. Constant communication will occur between all sample locations and P.B.S. in regards to sampling strategies. Area priorities will alter over time based on fleet distribution and the accumulated sample data from an area. When filling out these forms, first establish a system and continue using that throughout the season. Again emphasis is on consistency, neatness, and clarity. Both daily and weekly summaries will be completed using the same information which is as follows:

A) Record by area

I) Record by species

A) Total number landed and total weight (kilograms)

B) Total number sampled by grade

C) Corresponding scale book numbers

II) Number of vessels sampled

3. DATA PROCESSING CENTER

The data processing will be done at the Pacific Biological Station

in Nanaimo. All the data which the samplers will be recording will be entered onto the computer system for storage and analyses. All data must be submitted to the supervisor.

4. BIOLOGICAL SAMPLING

Biological sampling will involve taking fork length or orbital-hypural measurements, weights, and scales from a sample of fish. The following summary will outline the sequence of data gathering required to provide the most detailed sample information.

A) Set up a work area which should include:

- I) Table or work platform
- II) Tweezers
- III) Hand-tally counters
- IV) Clip-board with supply of sampling forms
- V) Scale books
- VI) Kilogram scale
- VII) Fork and orbital-hypural length measuring boards
- VIII) Field notebook (waterproof)

B) Interview the vessel skipper or plant foreman recording the area fished, target species, trip duration, and date in the field notebook.

C) Where possible, the entire catch of a vessel should be sampled. In cases where this is impossible, a minimum of 25 fish in each grade must be sampled. If time is a restricting factor, concentrate on sampling the larger grades which represent more year classes.

D) Processing each salmon involves accurately measuring and recording the following data on the biological sample form.

I) Fork length or orbital-hypural length (in millimeters)
II) Obtain two scales (one from each side on preferred area-see Figure 1)
III) Weight in kilograms (to nearest .1 kg)
IV) Species
V) Delivery type (vessel, packer, truck)
VI) Catch area and location
VII) Total species count (sum of all grades comprising one species)
VIII) Date and statistical week sampled
IX) Sample location
X) Grade designations, week code and the scale book and scale numbers
XI) Vessel name and related sample notations should be recorded in "comments"

E) Keep a count of all fish and a separate count of any marked (fin-clipped) fish by grade and species.

For the above categories, samplers are referred to the list of codes on the following page.

Those samplers working aboard packers in Areas 17 and 18 only will have the additional responsibility of enumerating and processing fish with a missing adipose fin. These fish have a coded wire tag (CWT) implanted in their nose and should be processed using basically the same method as unmarked fish.

First, remove each fish missing an adipose fin from each grade after the tote or bin has been weighed, keeping track of the total number observed and the total number marked. A coded disc tag must then be attached to the operculum and the fish's biological data recorded with the appropriate disc tag number in the comments section. The marked fish data must be recorded on a separate biological sample form and coded as disc-tagged fish (see biological sample codes).

Once all the information is recorded and disc tag attached, remove the fishes head by one of the two freezer cut methods according to the company's preference. The first method involves removing the whole head by cutting from the edge of the operculum forward and coming out approximately 2 cm behind the eyes. This cut should essentially bisect the brain and leave a wedge of cartiledge which will protect the meat from drying, etc. The second method involves removing only the top snout by cutting straight down from approximately 1 cm behind eye. This may be the preferred cut (and the easier) in most cases. Heads will be stored in buckets or waxed biological sample boxes by separate catch region.

There will be someone to give a demonstration on the two cutting methods prior to the opening of the season.

Biological Sample Codes

Column		Data
01	Label type	0-Biological sample only 4-Disc tag (random commercial head)
02-07	Date (DDMMYY)	
08-10	Statistical Week	
11	Week Code	
12	Sampling location code	1-Campbell River 2-Quadra Island 3-Courtenay 4-Deep Bay 5-French Creek 6-Nanaimo 7-Silva Bay 8-Cowichan 9-Sidney
13-14	Catch Region	04-Georgia Strait troll
15-17	Statistical Area	
18-20	Sub-Area	
21-23	Species	118-Sockeye 124-Chinook 115-Coho 112-Chum 108-Pink
24	Gear	1-Gillnet 2-Seine 3-Troll (General) 4-Troll (Day Camp Boat) 5-Troll (Ice Boat) 6-Troll (Freezer Boat)
25-28	Length (centimeters)	
29	Length code	1-Fork 2-Orbital/Hypural 3-Total
30-33	Scale Book No.	Number on scalebook
34-35	Scale No.	01-25
36-38	Weight (kilograms)	
39		1-Round 2-Dressed
40	Sex	1-Male 2-Female 3-Unknown

Biological Sample Codes (cont'd)

Column		Data	
41-42	Blank		
43	Freshwater age		
44	Saltwater age		
45	Colour code	1-Red 2-White	
46	Quality	1-Fresh 2-Cannery	
47-48	Grade	Chinook: 01-Red-large 02-Red-medium 03-Red-small 04-Red-jacks 05-Red-tiny 06-White-large 07-White-medium 08-White-small 09-White-tiny Coho: 20-Large 27-Medium 21-Small 22-Tiny	
49-63	Comments		

5. PLANT PROCEDURES

Each plant or buying camp provides the sampler with a unique work situation and samplers must therefore conform to the procedures of each plant/camp when obtaining a sample. Sampling personnel are guests in these plants and should act accordingly.

Sampling personnel will deal with more people in the fishing industry than anyone else in the Department of Fisheries and Oceans. These people will derive their opinion of the Department from what they observe from samplers in this program. Public relations is one of the best tools in getting cooperation from people in the industry. Rules of individual plants must be adhered to, as deliberately ignoring them may seriously jeopardize relations between the plant and the Department. If, for some reason, rules prohibit the selection of an adequate sample or prevent the sampler from completing his/her duties, then the supervisor should be notified immediately.

In an effort to keep the system running as smoothly as possible, the following instructions must be adhered to at all locations:

A) Do not argue with, or in any way antagonize the buying station management or staff.
B) Do not get involved with weighing fish or writing fish slips for a company. If a mistake occurs (and they often do) the blame could fall on the sampler.
C) If a sampler is offered employment at one of the plants, and wishes to accept, the supervisor must be notified immediately.
D) Learn how to handle the fish properly in compliance with company procedure. Do not throw or abuse the fish in any way. Troll fish are often destined for the fresh fish market and their appearance and condition affects their value. At no time should a fish be picked up by the tail as this causes separation of the flesh from the spinal coloumn.
E) Do not smoke in the plant. It is against both plant and health regulations.
F) At no time should samplers be standing idle at the plants. Any number of small tasks can be undertaken during slow times such as; pre-numbering sample forms, putting headings in the field notebook, or completing daily or weekly summaries. This not only keeps you busy but will speed up the operation when the sampling gets heavy.
G) Samplers must keep sampling area and equipment clean.
H) It is the responsibility of each sampler to report for work daily. If, for some reason, he/she is unable to report to work, then that person must contact the supervisor explaining the situation.
I) If in doubt, ask the supervisor for guidance in any of the above circumstances.

6. PERSONAL GEAR

In addition to personal clothing, samplers with require certain other articles which are supplied. The following is a list of of personal gear required:

A) Raingear (hooded jacket and pants)
B) Rubber boots
C) I.D. card (name, photo, position title)

Each sampler will be issued a sampling kit containing the following:

A) Tweezers/Forceps
B) Measuring Boards
C) Plastic measuring sticks (orbital-hypural)
D) Kilogram scales
E) Hand-tally counters
F) Knives
G) Disc tags (for packer samplers only)
H) Gloves (Marigolds - small, medium, large)
I) Plastic bags (for unusual specimens)
J) Folding table
K) Charts
L) Stationary
    I) Conversion tables (metric/imperial, dressed/round, etc.)
    II) Biological sample forms
    III) Scale books
    IV) Field notebooks (waterproof diary)
    V) Little red books (personal diary, travel, expenses, etc.)
    VI) Interview questionaires
    VII) Daily/weekly summary forms
    VIII) Note pads
    IX) Manilla folders
    X) Clipboards (scale book and sample sheet size)
    XI) Pencils, felt pens (small and large)
    XII) Erasers
    XIII) Elastics
    XIV) Rulers
    XV) Stapler/Staples
    XVI) Tape (scotch, fibre)
    XVII) Hart (Pacific Fishes of Canada)
    XVIII) Sampling manual

Samplers will be responsible for their own kit and must keep track of the number of forms, scale books, etc. they have so more can be ordered as they are needed.

7. SALMON SPECIES IDENTIFICATION

Although we are concerned only with sampling chinook and coho, there may be the occasion when it is difficult to differentiate between any of the five species. For this reason, a guide has been made to help identify all five species using external features and listing them in order of importance. Generally, any salmonid weighing 11.3 kg (25 lb) or more and caught off the B.C. coast is likely to be a chinook, however, five equally-sized samples from all species could create a problem. Please use the following guide:

Chinook salmon (also called; spring, blackmouth, king, tyee, smiley):

1. Teeth grow out of a black (at times gray) gum line.
2. Large black spots appear on the back and in the cartilage between fin rays on both lobes of caudal fin.
3. Attains large size - to 45.4 kg (100 lb).
4. Narrow caudal peduncle.
5. A strong pungent odour, unmistakable once recognized.

Coho salmon (also called; silver, hooknose, blueback):

1. Teeth protrude from a white gum line.
2. Few small spots on back and in cartilage between fin rays on upper lobe only of caudal fin.
3. The first ray of a depressed anal fin will reach beyond the midpoint of the fin base.
4. Wide caudal peduncle.
5. Small bluish dots on the collar of the "neck".

Pink salmon (also called; humpback, humpy):

1. Large, oval, opaque spots in cartilage between fin rays on both lobes of caudal fin.
2. Numerous, small scales.
3. Small fish (to 3.2 kg - 7 lb).
4. Develop exaggerated humps as spawning approaches.

Sockeye salmon (also called; red, sox):

1. Dull, gray tail - no spots, 1 to 3.6 kg (2 to 8 lb).
2. No spots on back, contrasting blue/green back and silver sides.
3. Thin, straight maxillary.
4. Large eye pupil.

Chum salmon (also called; dog, keta, quala):

1. Similar to a coho but average larger in size (7 to 20 kg - 15 to 44 lb).
2. No spotting on back or tail.
3. Caudal peduncle small and almost round.
4. Maxillary thin and straight. Does not hook down as obviously as coho maxillary.
5. Distinctive "parr" markings on the sides.

Steelhead (also called; rainbow trout):

1. Square tail, olive-green in colour, covered with small dots.
2. Thick, square caudal peduncle.
3. Red stripe or band follows lateral line from operculum to tail.

Appendix tables B through E do not appear in paper, but appear in microfiche form at the back of this report.